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INDUSTRIAL-ARTS MAGAZINE

Vol. V FEBRUARY, 1916 No. 2

ORGANIZATION IN THE TEACHING OF MANUAL AND INDUSTRIAL ARTS

F. D. Crawshaw, University of Wisconsin

(Twelfth Article)

FOLLOWING the consideration of a budget in manual and industrial arts and the study of the principles of scientific analysis and organization, especially with reference to their general application, it is appropriate to see how the instructor and supervisor can study the efficiency of his own performances scientifically. The purpose of this article is to study plans for the measuring of merit of teachers or their efficiency in teaching.

An application of the principles of scientific organization has been made, within recent years, to the measuring of pupil accomplishments in various lines of educational work. So-called educational scales have been constructed to measure handwriting, composition, and other school subjects. These scales are used much as any measuring stick or measuring instrument would be used to determine discrepancies or variations from the standard, or the scale itself. Consciously or otherwise we are measuring abilities and accomplishments in all branches of human activity. As a rule we do this by *unscientific* methods. We judge or estimate rather than accurately measure, and the standard also with which we make our comparisons is likely to vary. When one considers carefully the results of such measuring he must conclude that they will be unreliable except possibly in some accidental cases.

The problem of measuring, then, whether involved in a consideration of the efficiency of an institution or of individual performances as discussed in the last article in this series, or found in an evaluation of any similar corresponding individual activities, is much the same. Its solution should be scientific as far as possible. The essentials in the solution are:

(1) The selection of a scale.

(2) An analysis of conditions determined by the use of the selected scale.

(3) A reconstruction of the activities or performances to conform to the standard of the scale used.

Thus, in measuring handwriting, Thorndike's scale may be selected. With it one would measure a considerable number of samples of handwriting selected from a group of writers. From the results the average, mode, etc., of the group could be calculated and individual or group variations would be determinable. With these facts before the measurer he could prescribe as to what should be done to secure the "standard" accomplishment in handwriting in the community from which the samples measured were selected.

Let us take an illustration in the field of the manual and industrial arts where, as yet, we have no scales. As was said in the January number of this magazine, some means of scientific measurement of accomplishments are needed to place the manual performances in motor activity in a position to stand the tests of scientific measurement.

We will assume that in a city like Milwaukee, where in the woodwork of the seventh grade every boy is required as his first exercise to saw off to squared lines about a block, several pieces one-fourth of an inch thick. By collecting the results of all these sawings from all of the boys in the seventh grade for any particular year a scale in the accomplishment of sawing thus to a line could be constructed. (It is not the purpose of this paper to explain the details of constructing such a scale.) Such a scale could then be used to measure a similar accomplishment for all of the boys of the seventh grade in the Milwaukee schools for the succeeding school year, or, in fact, for a similar accomplishment for any other group of boys. By such a process of measurement it would be determined whether the accomplishment was "standard" or otherwise. Furthermore, deductions could be made as to the difficulties arising in the performance of sawing provided the accomplishment did not measure up to the standard. Again, if the accomplishment was superior to the "standard" established by the measure as determined by the mode, average, etc., deductions could be made as to the reason for this superiority of accomplishment. Thus the scale would *test the accomplishment* by comparing it with a standard of similar accomplishment and, further, it would *enable one to draw conclusions* regarding the *reason for variations*. Hence, future performances in similar accomplishments could be varied to change the known variations.

The example just given assumes that in the sawing process *one* particular characteristic in the result or one element in the performance is to be measured. It should be made clear that a single scale can measure but one thing. The foot rule measures linear distances or in a straight direction only. The scale for sawing would be constructed to measure nearness to standard in squareness of cut, thickness of blocks cut off, smoothness of surface sawed, etc. One other point needs mentioning, viz.: A scale must have a *base* or an *absolute unit*. In

the foot rule the inch is the base or absolute unit. In the scale for sawing one would arbitrarily choose a base by selecting one group of blocks which were, say, fifty per cent perfect. All blocks for any one of five or six or more other groups would then be estimated in terms of the first group.

Not long since an attempt was made to analyze the merit of teachers or their efficiency in teaching. Strictly speaking, the result of such an analysis is not a scale because not only one but *many* characteristics of teachers, or elements in efficient teaching, are to be measured by the result of such an analysis. One cannot divide and subdivide all of the numerous elements in teaching and call the resulting classification a scale with which to measure any one element. He would have to reduce the subdivisions to absolute units and use one of these only for any particular scale. However, the classification *as a whole* may serve as a *means* of measuring *all* of the elements considered. Hence for the sake of simplicity, and because the analysis makes use of scientific methods, we shall speak of the analysis as a scale.

Presented herewith are two such scales, one constructed by Dr. Edward C. Elliott of the University of Wisconsin to measure general teaching, and another, a modification of Dr. Elliott's scale, designed to measure the merit of manual and industrial arts teaching. There are presented also two other scales. One is headed "Score Card for Retail Salesmen," and the other "An Efficiency Blank," designed by Milton Clauser, Supervisor of Manual Arts in Salt Lake City, Utah, who formerly held a similar position in Denver, Colo., to estimate the efficiency of teachers in his department more accurately than could be done by merely judging of their merit in teaching as the result of casual observations of their work.

PROVISIONAL PLAN FOR THE MEASURE OF MERIT OF TEACHERS

Edward C. Elliott—The University of Wisconsin.

General Propositions.

1. Does not the general betterment of educational achievement finally depend upon, (a) the analysis of the complex teaching process into its essential, constituent elements; and, (b) the recognition and possession by teachers of the qualities and capacities upon which these elements are grounded?

2. Is it not possible to devise and to apply to the teaching process impersonal, objective standards of value whereby the relative worth and efficiency of teachers may be determined more justly and with greater precision than under the prevailing practices?

3. As fundamental conditions for the cumulative improvement of teaching, and for the greater effectiveness of school organization, should not teachers, (a) be encouraged and trained to determine their own professional worth in accordance with standards mutually agreed upon by teachers and supervisors; (b) receive the benefits of direct, constructive criticism, and the stimulation of continuous, skillful, personal, *non-interfering* supervision; and (c) claim exemption from *snap* measurements of their merit based upon casual visitation and intermittent inspection, and from the unsupported, arbitrary judgments of superiors?

4. Does not the economical improvement of the products of public education require that the conditions and results of the teacher's work be tested by methods of an objective, quantitative character rather than by judgments of a subjective, qualitative nature?

The Analysis and Provisional "Scale."

City (District)..... School..... Room.....
Teacher..... Grade..... Subject.....
No. of Pupils..... Boys..... Girls..... Date.....
Special conditions.....
.....

General Instructions.

Deduct from possible 10; very slight, 2; slight, 4; marked, 6; very marked, 7; extreme, 8. (Possible 20, 40, 60, 80, or 100, in same proportion.)

Total efficiency = Total Individual Efficiency *plus* Total Directed Efficiency.

Minimum standard for approval; according to the standards and exigencies of the school or school system.

Individual Efficiency—800 units	Suggested Values	Deficiencies	Determined Values
I. PHYSICAL EFFICIENCY—80 units	(80)	....	....
1. Impressions—general	10	....	....
2. Health—general	20	....	....
3. Voice	20	....	....
4. Habits—personal	10	....	....
5. Energy and endurance; power of relaxation	20	....	....
II. MORAL—NATIVE EFFICIENCY—100 units	(100)	....	....
1. Self-control	20	....	....
2. Optimism—enthusiasm	20	....	....
3. Sympathy—tact	20	....	....
4. Industry—sense of reponsibility	10	....	....
5. Adaptability	10	....	....
6. Sense of humor	10	....	....
7. Judicial mindedness	10	....	....
III. ADMINISTRATIVE EFFICIENCY—80 units.	(80)	....	....
1. Regularity at post of duty	10	....	....
2. Initiative; resourcefulness	20	....	....
3. Promptness and accuracy	10	....	....
4. Executive capacity	20	....	....
5. Economy (time, property)	10	....	....
6. Co-operation (associates and superiors)	10	....	....
IV. DYNAMIC EFFICIENCY—180 units	(180)	....	....
1. Preparation. Including: a. intellectual capacity; b. academic education; c. professional training; d. command and use of English	20	....	....
2. Professional attitudes and interest	10	....	....
3. Human nature attitudes and interest (Appreciation of values—physical, intellectual, social and moral, in child life)	10	....	....
4. Instructional skill	80	....	....
Including: a. Definiteness of aim and procedure; b. Attention and interest of pupils; c. Formality vs. vitality of instruction; d. Motor vs. verbal methods; e. Application of the technique of teaching; organization and presentation of subject matter; the recitation as an *artistic* product; f. Application of the technique of living; extent and quality of participation and contribution of pupils; the recitation as a *democratic* activity; g. The tools and machinery of instruction; effective adaptation; h. Assignment of work			
5. Responsiveness to directions and suggestions	20	....	....
6. Governmental and directive skill (discipline)	40	....	....
V. PROJECTED EFFICIENCY—50 units	(50)	....	....
1. Economical oversight of pupils not immediately under instruction	10	....	....
2. Continuing preparation a. Daily; b. Weekly; c. Annual	10	....	....
3. The school program	10	....	....
4. Increase of professional equipment (professional associations, study and reading; travel)	20	....	....
VI. ACHIEVED EFFICIENCY—250 units	(250)	....	....
1. Respect of pupils and community	30	....	....
2. Leadership; stimulation of individuals and community	30	....	....
3. School achievement			
a. Responsiveness of pupils; readiness and accuracy	30	....	....
b. Illustrative results	80	....	....
c. Examinations; rate and amount of progress of pupils	80	....	....
VII. SOCIAL EFFICIENCY—60 units	(60)	....	....
1. Intra-mural interests	30	....	....
2. Extra-mural interests			
a. Cultural and ethical	10	....	....
b. Civic	10	....	....
c. School—patrons	10	....	....
Total Individual Efficiency	800	....	....
Directed Efficiency—200 units			
I. SUPERVISORY EFFICIENCY—200 units	(200)	....	....
1. Constructive criticism	40	....	....
2. Non-interfering supervision	40	....	....
3. Community encouragement	40	....	....
4. Professional confidence	40	....	....
5. Recognition of individuality	40	....	....
Total Directed Efficiency	200	....	....

SUMMARY

Determined Individual Efficiency..... .....units
Determined Directed Efficiency..... .....units
Total Efficiency..... .....units

SPECIAL NOTE.

It is believed that this analytical plan for the study of teaching merit will be of the greater service if placed directly in the hands of teachers for their own guidance, and as a basis for co-operative effort between teachers and supervisors. *The plan is not intended to be used as a score card by inspectors.*

While the numerical values assigned to the several items are thought to represent general proportional worths, they may be considered as arbitrary, and as affording merely a convenient device for the recording of objective judgments and for the better diagnosis of defects.

PLAN FOR MEASURING MERIT OR EFFICIENCY OF MANUAL ARTS TEACHERS

Points

I. PHYSICAL EFFICIENCY 80
1. Health 20
2. Habits (physical effect) 10
3. Personality (physique appearance) 30
4. Physical endurance 20

II. MORAL EFFICIENCY 100
1. Optimism 15
2. Tact—sympathy 20
3. Industry 20
4. Adaptability 25
5. Sense of humor 10
6. Habits (upon moral fibre) 10

III. TEACHING EFFICIENCY (classroom work) 200
1. Course of study (kind) 30
   a. Flexible
   b. Progressive
   c. Dynamic
2. Demonstrations 40
   a. Statement
   b. Methodical doing
   c. Summary
3. Individual Instruction 40
   a. Groups together
   b. Individual help or suggestion
   c. Selection of problem
4. Discipline 25
   a. Pupils
   b. Room
   c. Promptness
   d. Economy
5. Reaction of pupils 50
   a. Interest
   b. Love or respect
   c. Technique results
   d. Character results
6. Correlation 15
   a. Community
   b. School
   c. Class

IV. CONSTRUCTIVE EFFICIENCY 120
1. Economic 40
   a. Organization of teaching material
   b. Organization of administrative material
      1. Records
      2. Stock and job cards
2. Social 40
   a. Community activities
   b. Civic interest
   c. School activities
   d. School administration
3. Educational 40
   a. Preparation
   b. Student's habits
   c. Membership in educational associations
   d. Productions

Total 500

AN EFFICIENCY BLANK

Milton Clauser, Supervisor Manual Training Department,
Salt Lake City Public Schools.

(Article in the Industrial-Arts Magazine)

The report could be filled out by the supervisor as a help to the superintendent in the confirmation of teachers serving on trial time.

It could be used in case of promotions, recommendations, etc.

It might, perhaps, be most valuable as a means of informing manual training teachers as to what may be expected of them; and thus help teachers discover their own strength and weakness.

And, the supervisor who will fill out a blank, or merely carefully read it when in one of his shops, may discover that he has been growing accustomed to some things that were better not overlooked; and consequently it will cause him to help teachers where help is needed.

Report Concerning the Efficiency of M..... who teaches at the.....School. ....., 1914.

I. Work.
   A. Tools
      1. Is there a place for every tool and every tool in its place?
      2. Are tools sharp?
      3. Are tools kept in good repair?
      4. Are tools used in correct ways?
      5. Do pupils know the names of tools and tool operations?
      6. Does the teacher show any interest and ingenuity in the construction of demonstrating apparatus?

   B. Models
      1. Do pupils' projects show clean tool work?
      2. Exactness?
      3. Finish?
      4. Originality?
      5. Are models well selected?

   C. Drawings
      1. Lettering?
      2. Lines?
      3. Neatness?
      4. Do pupils readily make freehand sketches of objects to be drawn?
      5. Do pupils think before they make lines or afterwards?
      6. Do drawings tell the whole story and no more?
      7. Do designs show individual initiative?

II. Pupils
   1. Do pupils show power?
   2. Progress?
   3. Interest?
   4. Attention?
   5. A good working spirit?
   6. Economy,
      (a) In time?
      (b) In lumber?

III. Teacher
   1. Personal appearance?
   2. Habits?
   3. Dress?
   4. Judgment?
   5. Disposition?
   6. Attitude towards
      (a) pupils?
      (b) fellow teachers?
      (c) principals?
      (d) supervisor?
   7. Instruction?
   8. Systematic in planning work?
   9. Discipline?
   10. In making out reports is this teacher
      (a) prompt?
      (b) accurate?
      (c) neat?
   11. Responsive to suggestions?
   12. Progressive?
   13. Does this teacher keep posted on educational progress?
   14. Does it show in his work?
   15. Does this teacher do any reading or studying outside of his regular school work?
   16. Does he keep in touch with the other school work?
   17. Does this teacher aim merely to follow the course of study or does he attempt to correlate the formal instructions with real life?
   18. Does this teacher oppose, follow or lead the course of study?
   19. Is this teacher strong in one or in all subjects?
   20. Would you class this teacher as excellent, good, fair or poor?

Additional Remarks:—

The fact that Mr. Clauser saw the necessity of such a scale, simple as it is and possibly not so complete as it should be, is a sufficient guarantee that there is a real need for scales to measure teaching merit. In using a scale for this purpose we shall be doing for teachers, in the matter of measuring their abilities, much the same as we do for pupils when we use an individual grade card which fairly covers the principal elements which need grading, to judge of their abilities.

How did we make a pupils' card? First, we divided it into sections, each determined by a group of technical abilities or personal characteristics. Each of these sections was then divided into parts to account for details of the group. What determined the sections and the details in each group of abilities represented by each section? An arbitrary selection. This point should be made clear. To be sure, the best judgment possible was used in this determination by reviewing past experiences in grading by the "good guess" method. In the end, however, the selection was made arbitrarily. It has been so in the selection of a *base* for all scales. It has likewise been so in selecting the *units* for all scales. That is, the scale and its units were selected arbitrarily but as the result of past experiences. A scale, then, may be regarded as the *cumulative experience gained in doing unscientifically what the scale will do scientifically.* We measure scientifically with a yardstick. Formerly people measured unscientifically without the use of the standard yard but with all sorts of substitutes and more often, perhaps, "by guess."

When Dr. Elliott constructed his scale he divided it into large groups which, as the result of experience, seemed to him to represent the important elements in teaching efficiency. In a similar way he selected the details of each group. Having done these two things he used the scale, had others use it, and then all participants in this process discussed its use. As a result it was reconstructed, perhaps many times, until it assumed its present form. The scale for use in measuring the efficiency of manual arts teachers, which is a modification of Dr. Elliott's scale, was evolved in a similar way. If now we wished to construct a scale to measure any *particular kind* of manual and industrial arts teaching we might do so by modifying the general scale for all manual and industrial arts teachers to make it specifically useful in measuring one particular manual arts performance.

Two things should be carefully considered in an analysis of several elements for the purpose of securing a means of measuring. First, the elements in any two or more sections of the scale should not overlap. For example, in "Dynamic Efficiency" there should not be included any of the details which naturally fall under the head of "Physical Efficiency" or "Moral Efficiency." If these three elements are chosen then Dynamic Efficiency should consider instructional skill aside from whether or not this skill is the result of good physique or good morals. Second, both elements and the details of elements should total in units to make numbers which may be comfortably handled. For example, it would not be well for a detail to be given a base of 7 out of a total element base of 86. Referring to Dr. Elliott's scale, the detail "Impressions" is given a unit base of 10 of an element base of 80. The fraction 10/80 or 1/8 is comfortably handled, especially when one considers what fractional part it is of the scale base, 800; whereas 7/86 would be an uncomfortable fraction to

SCORE CARD FOR RETAIL SALESMAN

(Prepared by Paul H. Neystrom, University of Wisconsin.)

	Perfect	Actual
I. Physical	(20)	
a. Health	10	
b. Appearance		
1. Bearing	2	
2. Clothing	2	
3. Cleanliness	2	
c. Voice	2	
d. Speech	2	
II. Intellectual	(24)	
a. Knowledge of English	4	
b. General education	4	
c. Technical knowledge		
1. Knowledge of the house (Organization, sales, campaign, history, competitors)	4	
2. Knowledge of the goods		
—Raw materials	1	
—Production processes	1	
—Cost of production	1	
—Structure	1	
—Qualities and quantities	2	
—Possible uses	1	
3. Knowledge of people		
—Classes	1	
—Standards of living	2	
—Industries	1	
—Social recreation	½	
—Customs, observances	½	
III. Personality	(22)	
a. Inclination to business	1	
b. Ambition	2	
c. Self-confidence	2	
d. Determination	1	
e. Honesty	2	
f. Agreeableness	1	
g. Courtesy, manners	1	
h. Purity	1	
i. Willingness to learn	1	
j. Willingness to co-operate	1	
k. Promptness	1	
l. Care of stock department	2	
m. Frankness	1	
n. Imagination	2	
o. Enthusiasm	2	
p. Love of the game	1	
IV. Salesmanship	(34)	
a. Getting attention	3	
b. Describing the goods	3	
c. Showing merit	3	
d. Meeting objections	3	
e. Persistence	5	
f. Convincing the prospect	4	
g. Closing the sale	5	
h. Making customer permanent	5	
i. Attracting trade	3	
Total	100	

Directions for Scoring: The score card with its 100% rating represents an ideal salesman. In judging the efficiency of any salesman, give him such part of the perfect score named for each point as may in your best judgment seem fair. If no improvement can be suggested, allow the "perfect" score; if "good" but not perfect, take off from one-tenth to one-fifth of the total score for the given point; if "fair" take off not to exceed one-fourth; and if "poor" take off not to exceed one-half. If the quality is missing, of course no credit can be given. A "good" salesman should receive a total rating of 90% or better. A "fair" salesman should receive from 75% to 90%. A "poor" salesman anything below 75%.

use in this calculation. It would be much more uncomfortable to handle if the scale base was 794, for example, instead of 800.

If we reflect upon the difficulty or ease with which calculations will be made in using a scale, we shall conclude that it is best, first to determine wisely the tentative base scale and then, by working back to the element bases, finally to arrange the units of a scale to make all base fractions simple.

The Use of a Scale.

First, the principal requisite in the use of a scale is *submission*. One may not agree with all the details or even the elements in a scale, but if he selects it for use he must submit to it. We do not ask ourselves whether the yardstick is the best measure for linear dimensions or not, when we are using it, altho we may warmly debate, at other times, the relative value of the yard and the meter as units of measure.

Second, in the use of a scale one must measure *similar* material. It is not advisable, if we are to determine the nearness to standard of a set of sixth grade papers in composition, that we measure *together* both sixth grade and seventh grade papers. If we wish to compare the nearness to standard of a set of sixth grade compositions and a set of seventh grade compositions we would *measure each set separately* and compare the result of each test with the standard and then compare these results with each other.

Third, in using a scale, one must do so *without prejudice*. He must measure carefully and mechanically. Much of the fallacy of scientific measuring is due to carelessness in operation. For example, in using a yardstick to measure the length of a floor one takes the greatest care to avoid "overlapping" or "open spacing." That is, he does not allow the yardstick, when moved, to lap back onto the last former position of the stick, nor does he move it too far forward when he shifts it from one position to another. It is equally true, too, that he should not be influenced in his measuring by *thinking* that the room is of a certain length. Unconsciously this thought might influence the accuracy of his measurement. *He must measure mechanically.* In the case of using human scales one must measure *unsympathetically*, otherwise the scale is of little value. In fact, it is to overcome the element of sympathy that a human scale, such as the one for measuring teaching efficiency, is made.

In this discussion some of the uses of an analysis of teaching elements for the purpose of measuring teaching efficiency have already been shown. In general, it may be said that such an analysis as we are considering has two principal uses: First, that which measures self, and second, that which measures self as compared with some one else.

The first of these uses is the one which is of particular interest to the teacher. He determines by the use of the scale whether or not in his case the element of "Teaching Efficiency" is worth 200 as compared with his element of "Moral Efficiency," for example, which is worth 100. In other words, taking moral efficiency as a base, is his teaching efficiency twice as great as his moral efficiency? The next question is: If it is not, why not? The details of the measurer's elements in teaching efficiency is then investigated. It will be discovered that the scale when used to measure a particular characteristic of an individual will show one detail to be low as compared with others. For example, under "Dynamic Efficiency" in Dr. Elliott's scale, "Instructional Skill" may be low as compared with "Preparation."

The second use is of interest and value particularly to the supervisor. He wishes to "rank" the instructors in a particular school grade or those teaching a particular subject. He measures their several abilities by the use of the scale in one or both of two ways, generally spoken of as the *vertical* and the *horizontal*. He measures them *vertically* by applying the scale as a whole to each individual separately. He may also measure them by applying each unit or element of the scale to each instructor before applying any other unit, or element. Example, he measures all individuals, one at a time, for physical efficiency, then for moral efficiency, etc. This is called horizontal *measuring*.

It is well to measure both vertically and horizontally to secure the most satisfactory results. The results of each kind of measuring should be the same. One set of results should serve as a check upon the other. Also it is well in taking a double measurement to keep the sets of data separately that mental suggestion may not play a part in the final results. Besides, it is conducive to accuracy to allow some time to lapse between taking sets of measurements, in order that the measurer may forget when he takes the second set what the results of the first set were.

Perhaps the principal advantage of a teaching efficiency measuring scale to a supervisor is that it gives him a rather accurate and impartial means of *substantiating his judgment*. If, for example, he believes that a teacher is deficient, he can bear testimony by using a scale. Again, if he determines by the use of a scale that an instructor is unduly deficient he may know how best to correct the error. If in his judgment a teacher should be dismissed for deficiencies which seemingly can not be corrected, the measurement data in the case will vouchsafe his recommendation for dismissal.

It has sometimes been said that one scale of a particular kind is as good as another for measuring a group. This is not true, because in one scale certain elements may be emphasized over others. However, in the long run, while one measuring device will raise or lower the rank of a certain individual, all measures of a particular kind will give *similar positions* in a ranking order to *divisions* of a group. For example, the group made up of the best pupils in a class will presumably be at the top, whether the class is measured by one scale or another of a similar kind.

It is advisable in all cases to use a scale rather than to depend upon individual judgment.

The fact that with a scale one will *measure* rather than estimate, judge or guess is a recommendation for a scale even tho it is crudely made. Besides, the scale is a *particular* standard by which all results will be

determined. This means that all results are comparable under the same conditions.

Results secured by means of judging or estimating, no matter how carefully done, are not possible of accurate comparison. Hence one's judgment regarding teaching efficiency, individual performances or institutional organization can never be as sound if secured by means of the guess method as it will be when measurements with a scale are made and the results of such measurements are compared.

Fig. 2. Craft Problems Constructed by Grades VII and VIII, Montclair, N. J., from their Own Drawings or Sketches.
(See page 53.)

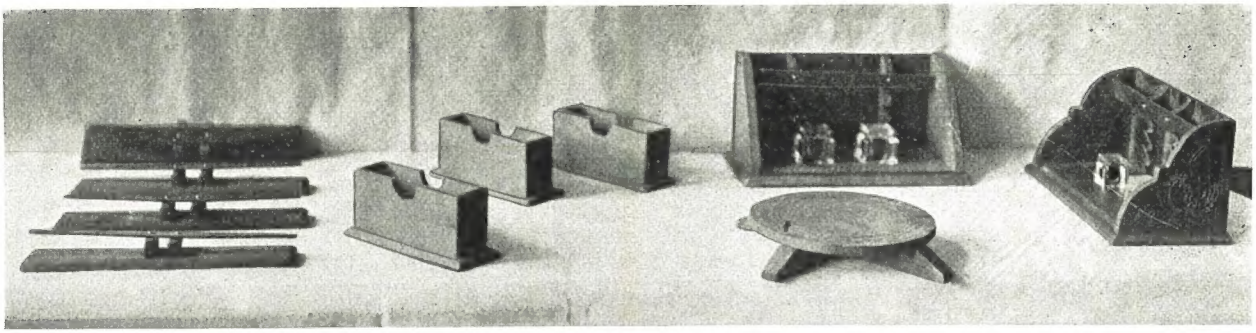


Fig. I. Craft Work Constructed from Drawings Placed on Blackboard. Grades VI and VII.

SCHOOL SHOP WORK IN MONTCLAIR, N. J.

Fred P. Reagle, Supervisor of Manual Training

THE scheme of work for boys in the elementary school shop, as carried on in Montclair, N. J., is the result of a growth and development extending over a period of years. Much of it has been conceived and worked out in a belief that the work done should take hold of that boyish enthusiasm which we come in contact with at every turn in dealing with youth—that enthusiasm which prompts boys to buy, borrow, or steal tools to make toys, roller coasters, bobsleds, water wheels, wireless sets, engines, kites and similar things that have go and move in them. A part of it has been devised and developed to acquaint boys with typical shop methods of work as carried out in our large industries. Still another experience is added to give a sympathetic understanding of typical building construction.

The scope of this article will be:

(A) To describe the four phases of work undertaken in grades 5, 6, 7, and 8 under the following heads:

I. Craft or individual work.
II. Correlation work.
III. Gang work.
IV. Building instruction—using stock lumber together with reasons for and arguments in favor of doing each kind of work, and,

(B) The apportionment of these four groups of work among the grades concerned—the formation of courses of study out of subject matter given in A.

A. The Four Phases of Work.

1. This first group, styled here craft or individual work is typical manual training as it is usually carried out in school shops. (See Figs 1, 2 and 3.) It consists of constructing small or large pieces of furniture or articles useful in home or school and, if no decora-

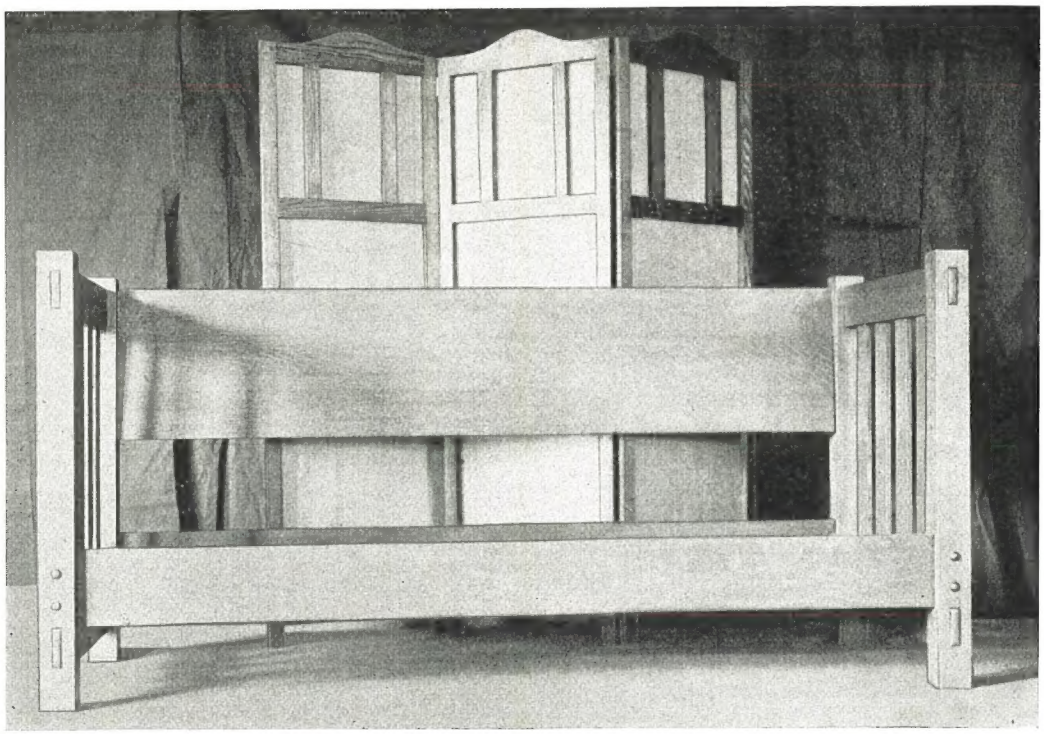


Fig. 3. Grade VIII. Craft Work. Each problem made by its designer from his own drawing.

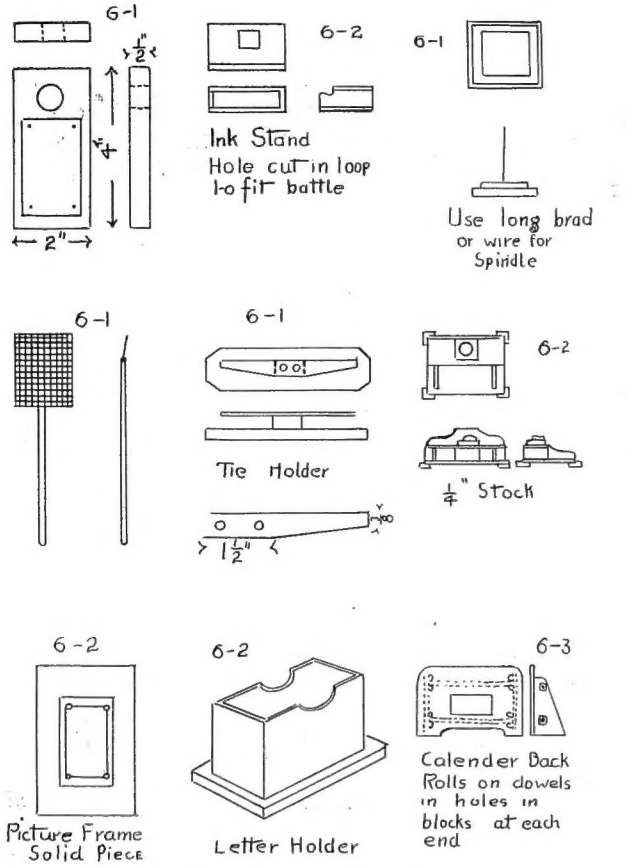


Fig 4. Shop Problems, Grades VI and VIII.

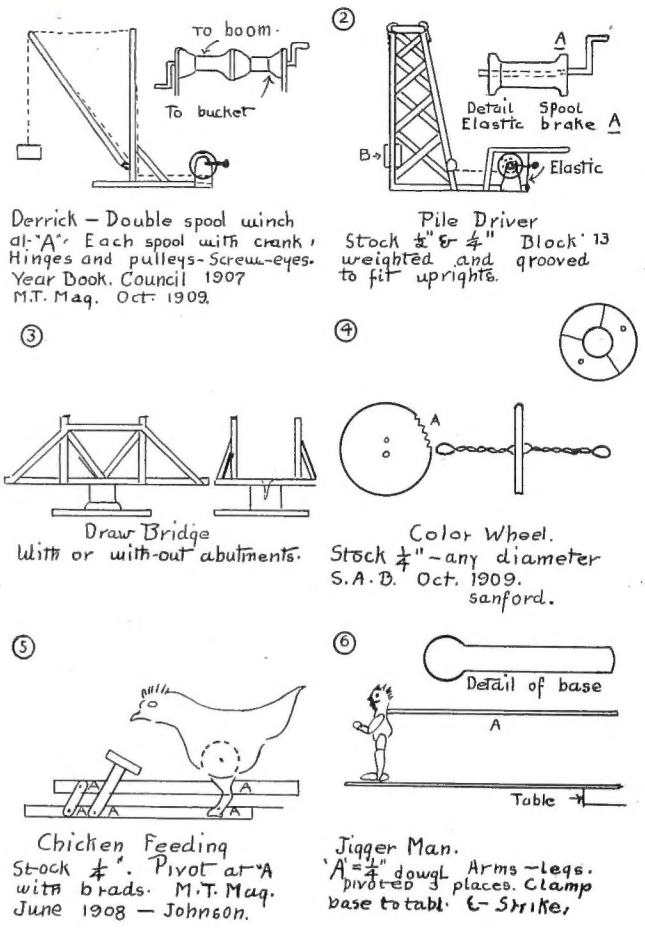


Fig. 5. Toy Problems.

tion is appropriate, of working out and applying designs to them either in water color or with veining tools or by carving. In the lower grammar grades—Sixth year—these problems are constructed from working drawings placed on the blackboard or from pupils' drawings copied from the blackboard into notebooks, or on sheets of cross ruled paper. The training obtained in this work of copying drawings is a valuable one in understanding this new language. In the upper grammar grades, seventh and eighth, working drawings of these problems are made by the pupils themselves after which each pupil constructs the object from his own drawing. These drawings are made in the shop using a combination drawing kit; such as Milton Bradley's No. 1 or No. 2. In proceeding this way our work follows the sequence of the industrial world, viz.:

(a) Idea in the mind,
(b) Drawing of same placed on paper,
(c) Construction.

After construction these pieces are finished in some

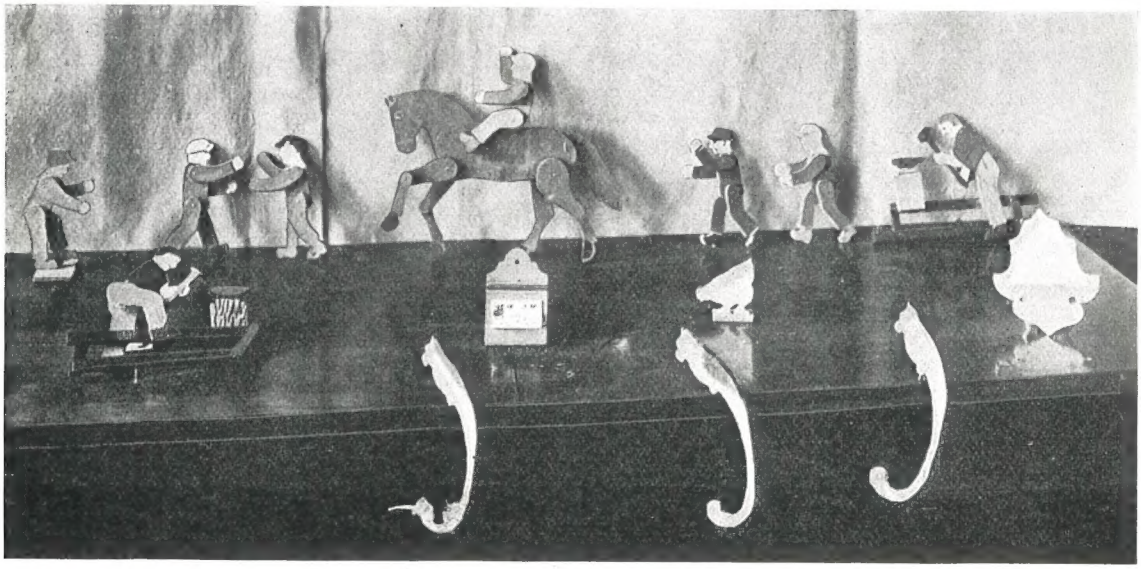


FIG. 6. TOYS MADE BY BOYS OF FIFTH GRADE.

appropriate manner that is within the reach of grammar grade pupils, viz., by:

(a) Shellac,
(b) Stain and wax,
(c) Stain shellac and wax,
(d) Stain filler and wax,
(e) Stain filler, varnish and rubbing.

This latter is possible in the elementary school only for a few boys and under favorable conditions—the absence of dust or the use of a special room for the purpose.

To arrange a selection of these problems that would meet our own needs in Montclair, we have prepared a number of mimeographed sheets (see Figs. 4 and 5), each sheet giving small, freehand dimensioned sketches of the projects chosen, together with a reference under each giving books or magazines or some other source of information. A course of study presented in this way is a vast improvement over one that is merely a series of names, because by this method the word taboret, under a dimentioned sketch of one with a reference to a certain one in a definite book, means something.

On these mimeographed sheets the craft work for each year is graded in tool processes and difficulty of construction and is divided into five groups of three or four problems in each group. One sheet for the sixth year contains the following names under appropriate sketches:

Grade VI—Group I.	Sand Paper Block.
	Bread Board.
	Spindle File.
	Fly Swatter.
	Necktie Rack.
Group II.	Ink Bottle and Pencil Holder.
	Picture Frame.
	Letter Holder.
	Calendar Back.

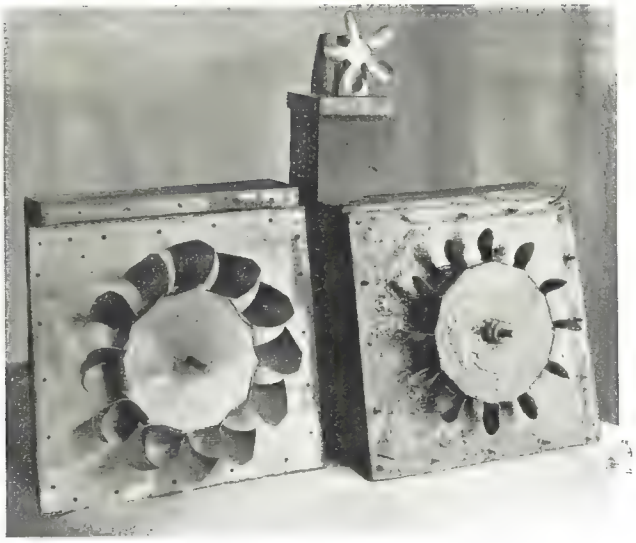


Fig. 7. Rotors of Pelton and Turbine Water Wheels. Grade VI.

This scheme offers to the teacher a variety of problems from which to select so that each sixth grade, for example, is working on a different problem, but, provided they are selected from the same group, one of the same degree of advancement so far as tool processes and difficulty of construction are concerned.

This craft or individual work offers certain advantages:

(a) It is a training in reading and making simple working drawings.

(b) It tends toward self expression and individuality.

(c) It gives skill in technical processes and methods of construction.

(d) It enables a boy to make useful and beautiful things for self, home, or school.

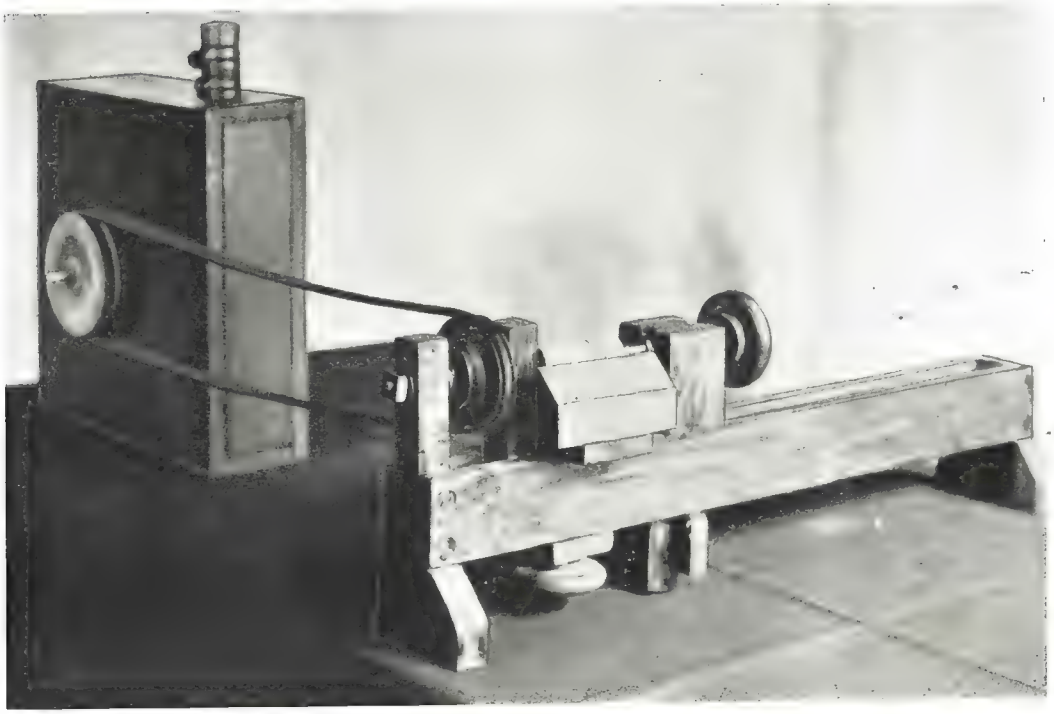


Fig 8. Pelton Wheel linked up to small lathe. Piece of wood in lathe actually turned and formed with resulting power.

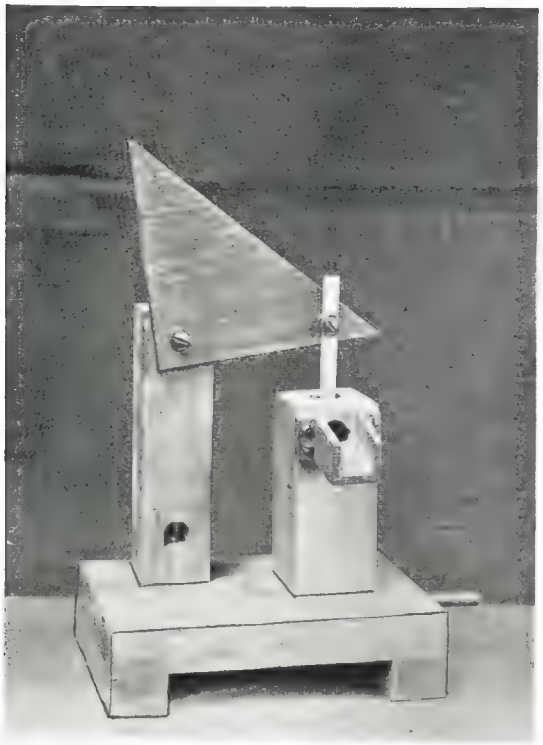


Fig. 9. Simple lift pump to be propelled by a connecting rod attached to a crank on overshot water wheel.

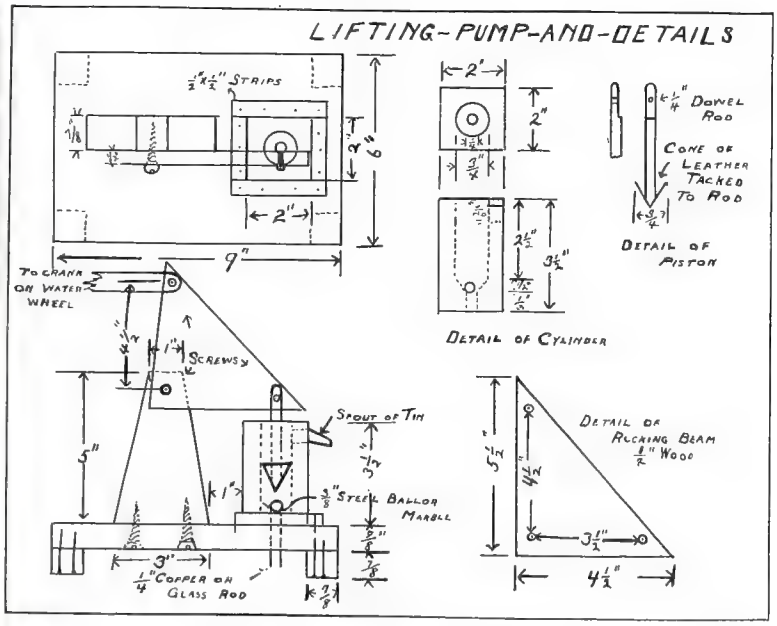


Fig. 10. Details of Simple Lift Pump.

II. Correlation Work.

The second group of problems, under the heading of correlation work, includes:

(a) Those of a mechanical nature that have the element of "go" or "move" in them.

(b) Problems illustrative of science.

(c) Industrial studies.

Most of these studies, however, are such a mingling of a, b and c that it is rather difficult to include any one of them under a definite sub-head. They are taken up and studied in groups, each group built around some one center of interest. The problems of any group are closely related and dependent on each other and thus the subject receives sustained interest extending over a considerable period. In this way the study exerts a much stronger educational pull than any single craft exercise or group of exercises, whose only relation to each other is technical sequence.

Granting that boys must learn to use tools, must become familiar with methods of construction and must develop adequate standards of technical excellence, too large a dose of such work is fatal. What tools a boy

Fig 11. Force pump with cylinder and receiver made of glass bottles.

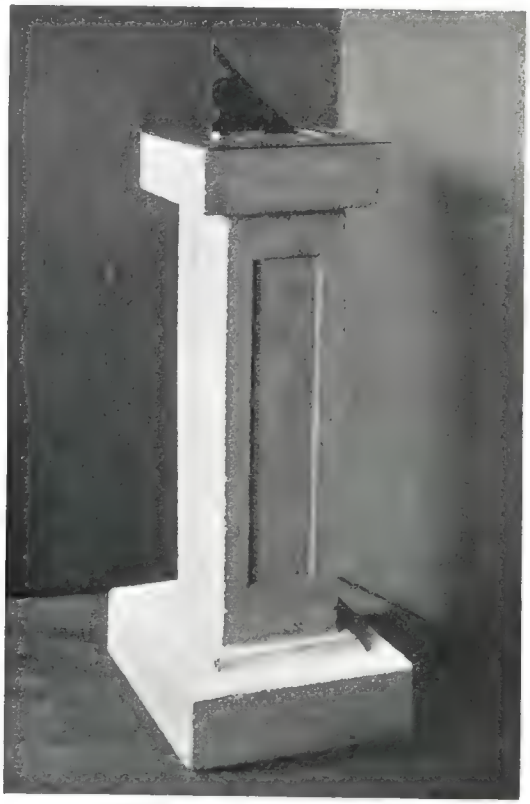


Fig. 12. Cement Sundial Standard. Grade VII.

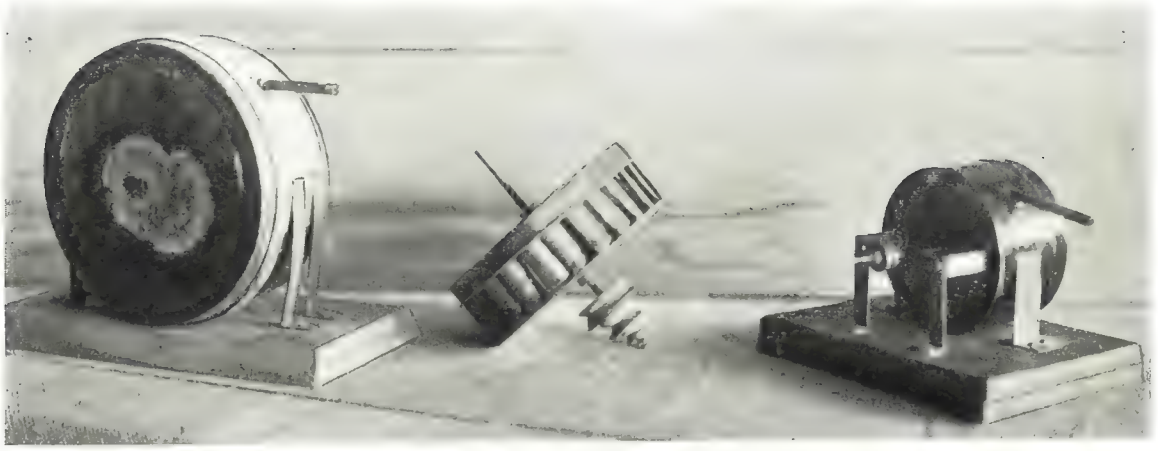


Fig. 14. Simple Steam Turbines made of tin cans. Grade VIII.

shall use is not nearly so vital a question as what he shall make. The first year or so of shop work is a novelty and the boys' inborn desire for activity and love of doing and working carries them thru. But the coat hanger-bookrack-sleeveboard type of work, however well presented, makes but a limited, temporary appeal. He should make, and is intensely interested in making, the problems of this correlation group because they appeal to his utilitarian sense and ideas of efficiency. He is keen in having his machine work, or go, and the only way he can bring about that end is to do the work accurately and well enough so that that will happen.

The apparent difficulty in doing this kind of work is the lack of specific directions and information. True there is no abundant supply of these problems in book form but the teacher must hunt up data, and devise problems or adapt constructions to school use. He must make himself familiar with industrial topics for this purpose.

The attempt will be made in this limited space, to show by means of cuts and drawings selected from the different studies, the scope of work in this group that has been carried out successfully. A number of these studies will be expanded.

These groups are as follows:

(a) Mechanical toys.

(b) Hydraulics.
Water wheels and secondary machines.
Water pumps. Figs. 9, 10, 11.

(c) Time and its measurement.

(d) Air.
Air at rest—barometers and thermometers.
Air in motion—windmills, kites and aeroplanes.

Fig. 13. Eighty-five feet of cement sidewalk being laid by two 7th grade classes to connect shop with grade building.

(e) Cement. Figs. 12, 13.

(f) Printing.

(g) Steam.

(h) Electricity. Figs. 16, 17.

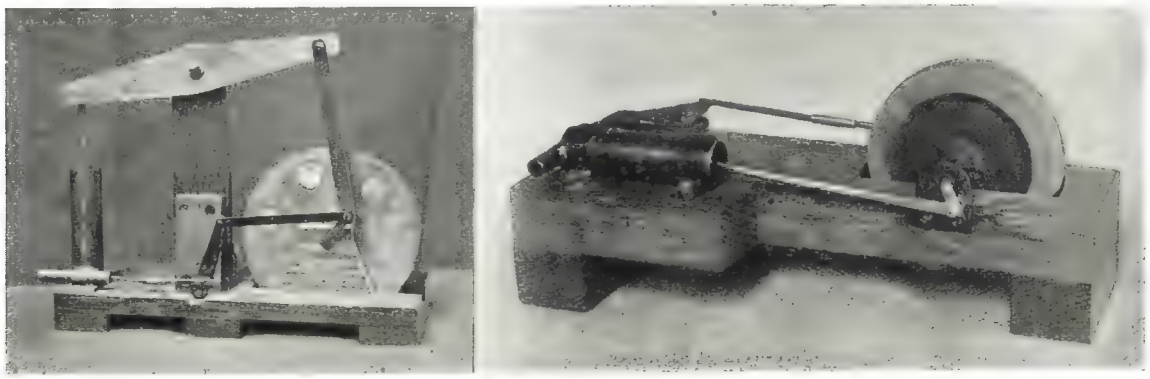


Fig. 15. Simple Cylinder Engines built of stock material. Simple Acting Cylinders ¾-in. x 2-in. brass pipe.

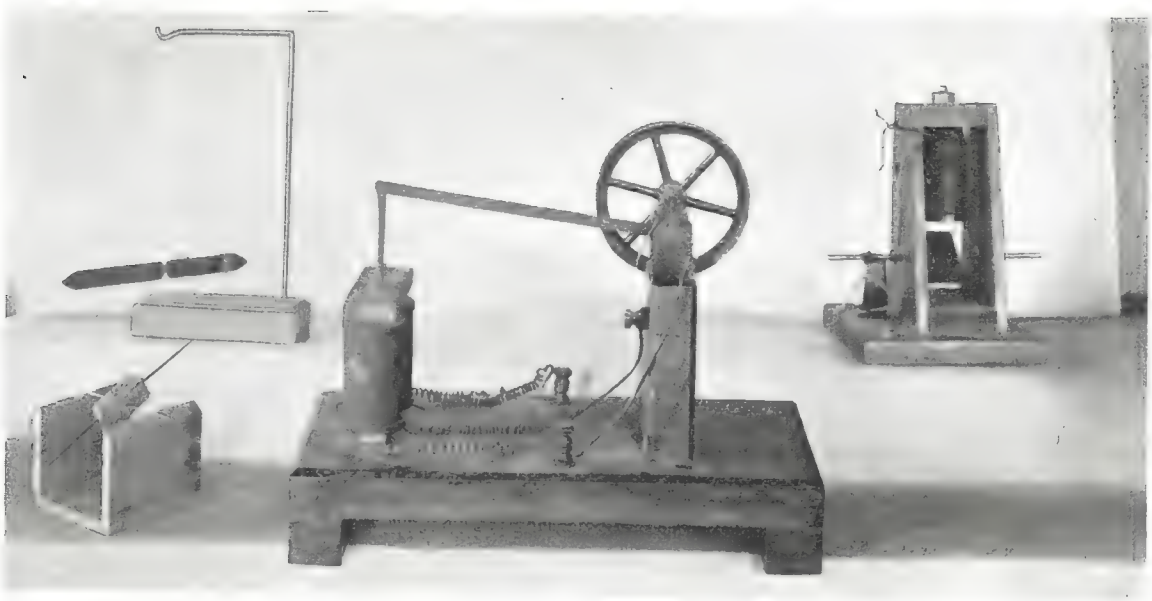


Fig. 16. Compass, Dipping Needle and two simple types of Electric Motors. Grade VIII.

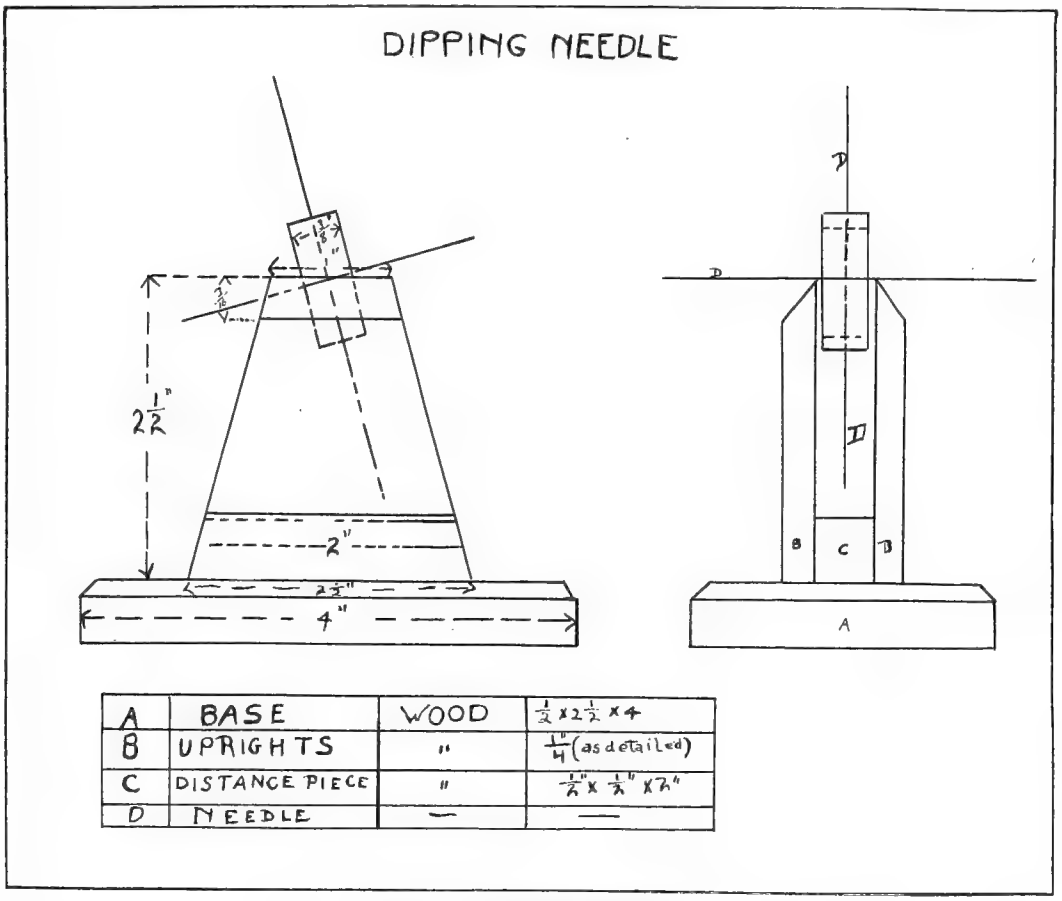
In expanding, a number of these studies around centers of interest, references are given, both to sources of information on the correlation study and, in as far as possible, under the problems to be made to available books, magazines, etc., which give detailed drawings or directions.

Interest—Toys. See Fig. 6.

References—"Coping Saw Work," Johnston; Manual Arts Press. "Toy Making as a Form of Constructive Work," Garritt—1907. Yearbook of Council of Supervisors.

Problems—Different kinds of toys. A. On bases or wheels. B. With movable parts. C. Representing industrial devices as derricks and pile-drivers. D. With movable parts worked by hand or gravity.

References—Those already given, and A. Sheets of



A	BASE	WOOD	$\frac{1}{2}$ x 2$\frac{1}{2}$ x 4
B	UPRIGHTS	"	$\frac{1}{4}$" (as detailed)
C	DISTANCE PIECE	"	$\frac{1}{2}$" x $\frac{1}{2}$" x 2"
D	NEEDLE	—	—

Fig. 17. Details of Dipping Needle.

imported wall paper giving many toys in colors. Supply Houses. "School Arts Book," Nov., 1909; Oct., 1909; Dec., 1911.

Interest—Water Wheels. See Figs. 7, 8.

References—Textbooks on Physics. "Harper's Machinery Book for Boys," Harper Publishing Co.; "Scientific American Boy," Munn & Co.

Problems—A. Current wheel. B. Breast wheel. C. Overshot wheel. D. Pelton wheel. E. Turbine.

References—"Scientific American Supplements," Nos. 24216, 24200, 24184, 799, 805, and 1199. 10 cents per copy; "Scientific American Supplement," Nos. 1914 and 1312; "School Arts Book," April, 1911.

Interest—Cement. See Figs. 12, 13.

References—"Manual Training Magazine," Dec., 1911, and October, 1913. "Art and Industry in Education," 1913, Teachers College, Columbia University. 25 cents. "Concrete Pottery and Garden Furniture," Munn & Company. $1.50. "Manual Training Course in Concrete," Association of Cement Manufacturers, Bellevue Court Bldg., Philadelphia, Pa. (Free.)

Problems—Wooden moulds: flower jars, window boxes, garden seats, sun dial, standards. Swept Forms: flowers, jars, urns. Typical uses of cement: sidewalks, walls, abutments as needed around building. Gang job.

References—References given under interest cover these.

Interest—Steam. See Figs. 14, 15.

References—Textbooks on Physics. Engineering Books.

Problems—Simple Steam Turbines. Simple Cylinder Engines.

References—"Manual Training and Vocational Education," March and April, 1915. Shop Notes Department.

What Vocational Education is Needed by Painters and Decorators?

Extract from the Minneapolis Vocational Education Survey

AT present there are approximately 2,000 painters and decorators employed in Minneapolis. The report of the United States Census gives the number of painters in the building trades in 1910 as 2,017. The secretary of the Builders' Exchange estimates that 1,683 men are employed as painters and decorators on buildings. His estimate does not cover the men employed as sign painters or as wood finishers in factories. The growing use of plaster or stucco as outside finish and the tendency to simplicity and the avoidance of over-decoration in interiors have held the trade nearly constant in the growth of the city.

The outside painter is liable to injury from falling from scaffolds. Casualty companies rate the work of the outside painter as more dangerous than that of the carpenter, steamfitter or woodworker, but less so than that of the bricklayer, sheet metal worker or structural iron worker. Both employers and employes agree that while few painters die of lead poisoning or kidney trouble contracted in the work, all are more or less affected by it and that it is the most unhealthful of the building trades.

Eight hours constitute a day's work in the trade and, as a rule, painters do not work Saturday afternoons. The busiest months in the trade are April, May, June, September, October and November. The less active months are July and August, while practically no painting is done on buildings in January, February and March. In these months, some painters find employment in automobile repair shops and furniture factories. Painters and decorators on buildings receive from 50 cents to 60 cents an hour. Approximately 80 per cent of the journeymen painters and decorators in the building trade are members of the union. A man is at his best in the trade between the ages of 21 and 50.

NOTE:—This description is a section of the chapter on the building trades of the Minneapolis Report. Each of the building trades has been analyzed and the pertinent facts given. The reports of each trade were written in close consultation with representative employers and employees, and in their present state have been approved by the trade itself.

Conditions indicate that there is no need for a large number of additional painters in the trade. The present number of apprentices, together with the influx of painters from other cities, furnishes an adequate supply to meet the needs of the city. There is a constant demand, however, for skilled painters with artistic taste and ability, and such men will find ready employment and fair remuneration in the trade.

As a large majority of the painters of the city are in shops in which union rules are recognized, the apprenticeship system is practically governed by union rules, which provide that no person shall be permitted to learn the trade before he is 16 years old, or after he is 21 years old. One apprentice is allowed for the first three journeymen employed and an additional apprentice is allowed to ten additional journeymen. Each journeyman having a son desiring to learn the trade is allowed to take his boy as an apprentice.

The apprentice receives $7 a week during the first year of his apprenticeship; $12 the second year, and $15 during the third year, the third year completing the apprenticeship. Before entering his apprenticeship the boy signs a contract agreeing to serve three years as an apprentice at an agreed wage, the employer agreeing to employ the apprentice steadily and to "use all proper endeavor to instruct him to learn the trade."

At present 25 apprentices are registered with the union. If the full quota of apprentices allowed by the union were employed, more than 200 apprentices would be learning the trade. No system of selecting apprentices is practiced. Sometimes sons of painters desire to learn the trade and are engaged. Occasionally an employer advertises for an apprentice and selects the most promising applicant.

The trade includes six classes of workmen: Apprentices, house painters, wood finishers, paper hangers, interior decorators, and sign painters. The first five represent the stages of advancement sometimes followed by

the workmen. Each of these lines, especially the sign painting, has become largely a trade of itself, the workman in many cases becoming a specialist in some one of the trades. The specialist finds it difficult to remain continually employed at his line of work, and the man with a working knowledge of all branches of the trade has many more opportunities to find employment than the specialist.

The Apprentice.

The boy may be apprenticed to learn any one branch of the trade enumerated, but by confining his training and experience to the one department of the trade, he limits his future opportunities and closes some of the avenues of promotion which might be open to him. It is possible, however, for the apprentice paper hanger to advance eventually to foreman paper hanger without doing any painting or finishing, but the opportunities for so doing are limited. It is also possible for a young man to become an interior decorator without having been a paper hanger or house painter, but the interior decorator finds it much to his advantage to have had that experience.

The ambitious young man entering the trade, whether apprenticed to learn wood finishing, house painting, wall papering or interior decorating, will do well to learn all branches of the trade thoroly. His chances for advancement to foremanship will be multiplied and his employment will be much more steady. It is customary for a firm engaged in house painting to do wall papering and interior decorating, and the firm specializing in wall papering to do house painting and interior decorating, therefore a foreman in such an establishment must have a knowledge of all the lines of work carried on in the shop. It would be well for him to take some training in art and design early in his experience and to continue to study thruout his career as an apprentice and journeyman. His value and consequently, his wages, will depend to a great extent upon the amount of taste and intelligence he uses in his work.

The apprentice who goes to work with a house painter usually spends some time in the shop cleaning up paint cans and brushes, and is then put to work at sand papering or removing old paint on some building. After a short time he is allowed to put on the priming coat until he learns to handle the brush skillfully. In time he is allowed to apply the second coat and to take part in the entire job of house painting. The journeyman gives him some instruction concerning the mixing of paint but, as a rule, the journeyman puts in the proper amount of oil, drier, lead and color and the apprentice does the stirring and straining. If the apprentice is observing, inquiring and persistent, he may find out what is put in the mixture and why it is put in.

To become a competent house painter, he must learn about the kinds and grades of brushes and their use, treatment and care. He must learn the composition and properties of the various materials used in painting, how to test pigments, oil and driers, and the effects of heat, moisture and acid on paints and colors. He must be able to name and recognize tints, shades and colors, must have a knowledge of color harmony and contrast, and must be able to analyze a color in order to mix a paint that will match it when dry. It is essential to know how properly to prepare plaster, brick, wood, and metal surfaces for painting as well as to patch, size and prime a surface. Ability to finish a surface flat or glossy, to stipple and smalt, to apply and finish enamel is a further essential. There are few opportunities in the trade itself for the apprentice to acquire this skill, and information, and because of this lack of opportunity the apprentice usually learns to do one thing and is kept at that work continuously.

For his own safety, he must learn to construct a safe scaffold and to test a scaffold before working on it. He must learn to work on a ladder without becoming dizzy, and so to adjust his weight on the ladder that he can cover the largest surface possible without moving the ladder. He must learn to swing a scaffold from the top of a high building and to lower it evenly and surely. This knowledge of paints, colors, surfaces and scaffolds is essential in all other lines of the painting trade, especially in sign painting. While sign painting is not a building trade, it is mentioned in this connection on account of its close relationship to other lines of the painting trade.

The apprentice paper hanger usually begins by working about the shop, cleaning brushes and paste cans. After a few weeks, he is taken to a job where he scrapes off old paper from the walls, washes walls and fills cracks with plaster and cleans up after the journeymen. Then he is allowed to apply the paste to paper, to trim edges and, eventually, he is allowed to experiment in hanging paper on the wall. The apprentice wood finisher is put at cleaning and sand papering wood surfaces for the finisher. He is later put at puttying and filling cracks. In time he is taught to apply filler and rub it in, to apply stains, shellac, wax, and varnish.

The apprentice in a general painting and decorating shop may learn, during his apprenticeship, something of all these branches of the trade. It will be to his advantage to learn as much as possible of all of them.

Physically, the apprentice should not be above the average weight, as he must be able to get about on ladders and scaffolds. His lungs should be sound in order to endure the constant inhaling of paint fumes. His hands, arms and wrists must be flexible and he should have keen sight and be able to distinguish colors. If he is to advance in the trade, he must have at least a good common school education, considerable patience and endurance, an accurate sense of color, and some artistic sense. To an ambitious young man, willing to study and improve, and thus endowed mentally and physically, the trade offers an attractive future, but to the person mentally or physically lazy, of careless and indolent habits, the trade offers little more than a bare living.

The House Painter.

There are between 1,100 and 1,200 house painters in the city. The typical house painter is between 21 and 55 years old. He works eight hours a day and usually receives 50 cents an hour for his work.

His work consists of preparing outside surfaces for

paint and applying priming and finishing coats to paint. On new wood surfaces he must look over the surface carefully and cover all sappy and knotty places with some preparation to prevent too rapid absorption. He then applies the priming coat and one or two further coats of paint as the case may require. He usually puts a different color of paint on all wood trim of the house. A house painter must have a thoro knowledge of surfaces and materials, as described previously, and if he is to advance to the position of foremanship, he must have a knowledge of the amount and cost of materials necessary to cover surfaces and the time required for the work.

The most common deficiency of house painters is their lack of knowledge of the nature and properties of the materials they are using, their inability to match colors and their lack of knowledge of the other lines of the trade which would enable them to find employment when there is no house painting to do.

The Wood Finisher.

There are a number of men constantly employed as wood finishers in the building trades, and a large number of men in furniture factories and cabinet shops, who specialize in this work. Finishers on outside work who are usually able to do painting or wall papering, receive from 50 cents to 55 cents an hour. Men specializing in this work in factories and cabinet shops receive from 25 cents to 35 cents an hour.

The work consists in first preparing the wood surface for the finish, then filling the pores of the wood with a prepared filler or shellac and applying stain, shellac or varnish, as the case may require. Oftentimes a coat of wax is applied after the shellac, and whether the surface is waxed or varnished, the surface is rubbed to a polish. On fine woodwork the finish called "French polish" is often given, which requires considerable skill. On varnished surfaces, which are rubbed down, the varnish is first rubbed with pumice stone and later with rotten stone and oil.

The wood finisher must have a thoro knowledge of the chemical properties of the materials he uses and also a knowledge of the nature of the wood to which he is to apply the finish. Different woods require different treatment and the same materials applied to different woods will often produce a different color and finish.

It is practically impossible for the wood finisher to acquire all the knowledge necessary for efficient work in the regular routine of the shop. Some outside agency must supply the opportunity for gaining knowledge.

The Paper Hanger.

There are approximately 400 paper hangers in the city, of whom some are transients who do paper hanging when they can find nothing else to do. The paper hangers have a separate organization, with approximately 200 in the union.

The demand for paper hangers has increased greatly within the last few years, caused by the tendency of apartment houses and hotels to use wall paper instead of paint on their walls. The demand, however, is for plain paper, with small borders and panels, requiring considerable skill on the part of the workman.

Wall papering does not require a great amount of strength, consequently a man can continue at this work until he reaches the age of 60 or 65. While some piece work is done in the city, the union scale is 55 cents an hour, with an eight-hour day.

The work consists of preparing new and old walls, of cutting paper to the proper length, of trimming off blank margins with a knife and straight edge, of applying paste to the paper, placing it on the wall smoothly and rubbing out all air bubbles with a dry brush and roller. On old walls the paper must be scraped off, all cracks and depressions filled and smoothed up with a mixture of plaster paris, all angles must be pointed up and the wall sanded smooth. New walls must be sized with a coat of thin liquid glue. The workman must understand the making and testing of paste and the proper consistency of paste for different papers. He must be able to cut the paper to edge and match the paper properly. All panel work must be laid out with some taste and all edges colored so that the seams will not be seen. A room may be made to appear large or small with the use of wall paper of the proper pattern, and ceilings may be made to seem high or low by the placing of moldings and borders. It is very essential that the wall paperer understand these relations.

The Interior Decorator.

Interior decoration has of late years taken on the nature of a profession rather than a trade. This change has been caused by the high degree of skill, taste and technical information which is required of the expert in this line. There are between 90 and 100 men who devote their entire time to interior decoration in Minneapolis. The interior decorator occupies the highest position in the building trades, receiving from 60 cents to 80 and 90 cents an hour and works eight hours a day.

The value and efficiency of the interior decorator lies in his artistic sense and ability rather than in his skill in the use of brush and paint materials. While all the work of the interior decorator must be skillfully done the taste used in this work determines the appearance of the work.

The interior decorator must have a thoro knowledge of color harmony and contrast, be able to read and analyze colors, and to mix a color with water, acid distemper, dye or oil. He is often called upon to reproduce a picture on a wall, requiring that he be able to draw the desired picture on the wall and paint it in the colors desired. He is often called upon to stencil various figures on walls, and in so doing must draw the design first on the paper and then cut out the parts which are to appear in color on the wall. He can then repeat the motif indefinitely.

Interior decorators state that evening courses in drawing and applied design, color analysis, harmony and contrast, the designing of borders, panels, and so forth, will be of great value.

Architecture in the Secondary School Curriculum

Rexford Newcomb, Director of the Department of Fine and Applied Arts, Polytechnic High School, Long Beach, Cal.

MANY schools of secondary grade thruout the country have offered courses in architectural drawing or structural drawing but few schools have, it is believed, attempted to offer a course of architectural study extending thruout the four years of high school. There was some question in the mind of the writer with regard to the wisdom of such a course when he was asked to establish the work in the Polytechnic High School. However, after three years' work with young men of this age, he is convinced that the training of architects may well be begun in the second year of the high school, provided the elementary training has been of the correct nature. The results obtained in three years' work are in every way of any such classification, and at the end of the first year, the work was incorporated as a division of the Department of Fine and Applied Art.

It is believed by the writer, that, altho it had been proven to the satisfaction of the students of the problem that it was possible to train students of this age along the line of construction drawing and detail drafting, it is likewise possible also to approach the subject with the secondary student from the fine art side as well. Indeed, it has been proven to his satisfaction, and moreover, he contends that in view of proposed professional study, it is the correct approach. It gives the student the needed cultural training (when combined with the correct humanities) which must serve, not only

House Designed and Superintended by A. J. Smith, Sophomore Student, Long Beach High School.

gratifying and continued success and good results are vouchsafed.

With the wave of enthusiasm for manual, vocational and polytechnic training that has swept over the country in the last few years, many courses have been added to the secondary curriculum. Many of these courses have gone to the extreme of being completely and absolutely "practical," eliminating many of the so-called cultural subjects previously offered to high-school students. In planning the architectural course in this school, precaution was taken to safeguard the course from this mistake, and altho the subject of architecture—architecture as a fine art—safeguards itself, being in its very nature strongly cultural, there was nevertheless a question involved as to the classification of the course. Should it be given as a branch of the fine arts or as a branch of the industrial arts? It was at first determined to classify it as a mechanic art and indeed, in the preliminary institution of the course, it was classified in this manner. The scope of the course as presented by the writer immediately showed the folly as a basis for further professional study, but also as a basis for life should his career lead him into other fields. So then, the policy here has been to strive for a correct balance between the two methods of approach with emphasis on the fine art side.

This determination was influenced, largely, by the writer's observations in commercial offices. Always there is an opportunity in the practical office for training in construction, detailing and the mechanical operations. On the contrary, there is little or no opportunity for the young draftsman to study freehand drawing, history of architecture, modeling or historic ornament. Therefore, it has been the policy of the school to give as liberal a proportion of these subjects as possible without unduly unbalancing the course and utterly disregarding construction, strength of materials and statics.

One drawback to a complete study of mechanics and materials in a secondary course is the student's lack of mathematical knowledge. Attempt has been made as will be noted by an examination of the accompanying schedule, to give the maximum amount of mathematics

in the course without encroaching upon English, history, languages and science.

Our course attempts to meet the needs of two classes of students namely: Those who have determined to make architects or architectural draftsmen of themselves and those who are investigating the subject of architecture with a view of ascertaining whether or not they are adapted to this line of work, which after all requires that certain natural talents must exist in the student as prerequisites to a successful career. A student can usually readily determine whether or not this is his "fort," and it is essential that the secondary school should maintain laboratories where the student may try for himself, his hand at the various vocations.

Of the first class there are again two classes: Those who will pursue professional studies in technical schools and colleges upon graduation, and those who must finish their theoretical training with us. For those who are looking forward to further study, it is the policy of the instructors to see that, first of all, the student makes his entrance requirements at the advanced school and secondly that he gets a maximum of studies that will serve professionally. These are usually more likely to be liberal or cultural, rather than technical in the case of preparatory students. In the studies of a technical nature that are taken, it is the practice to present the work according to methods used in the university. This difference in presentation is made in the latter two years and consists of requiring technical reports on some given line of investigation, certain library researches, especially in the history of architecture, and a use of the lecture and quiz method of presentation rather than the time honored recitation, used universally in secondary schools.

For those who must go into practical work upon graduation, a more liberal percentage of vocational work is allowed, but all are encouraged to make university entrance requirements whether they intend to use them or not. Of course a certain number of cultural studies are absolutely required for graduation but it is possible for a boy with limited time to take a big percentage of technical studies, provided he does not care to graduate and provided he has his prerequisites to the proposed studies.

For young men who wish post-graduate work, studies of college standard are offered as the demand warrants, and it is possible under the present organization for a student to continue architectural study two years beyond graduation from the four-year course. These courses may be taken either by day or night and in this way opportunity is offered to the boy who has been compelled to go to work.

The course of study, herewith presented is, therefore flexible within certain limits and rightly so. A prerequisite system is maintained, however, so that a student is assured of being prepared for a course when he takes it up.

Course of Study.

ARCHITECTURE.

X.

9th Year—

English	5
Geom. Drawing	5
Freehand Drawing	5
Woodshop	10
Applied Mathematics or Algebra	5

Three Houses Designed in 1914 by Floyd P. Ray, a Sophomore Student.

A GROUP OF BUILDINGS DESIGNED IN THE AUTHOR'S CLASSES.

1. House in Mission Style. Designed and superintended by Miss Agnes Durfee. 2. Wilson Building. Designed by A. J. Smith (Junior). 3. House designed and superintended by Aaron J. Smith (Junior). 4. Garage. Designed by Clarence Aldrich (Senior). 5. Peterson Residence. Designed and superintended by Aaron J. Smith (Sophomore). 6. Glendale House. Designed by C. Aldrich (Senior).

10th Year—

English	5
Ancient History	5
Algebra or Geometry	5
Architectural Drawing	10

11th Year—

Str. of Material and Graphic Statics	5
Architectural Drawing	5
Freehand Drawing	5
Algebra or Geometry	5
History of Architecture	5

12th Year—

Trigonometry and Surveying	5
Architectural Drawing	10
Civics and U. S. History or Economics	5
English	5

It will be noticed that a prerequisite of a year's study of freehand drawing and mechanical drawing is required for entrance to the architectural courses. The freehand drawing is especially arranged for architectural students with emphasis upon architectural models, drawing from ornament, freehand perspective and still life. Two years of freehand are required by the course for graduation. It would be better if four years could be required.

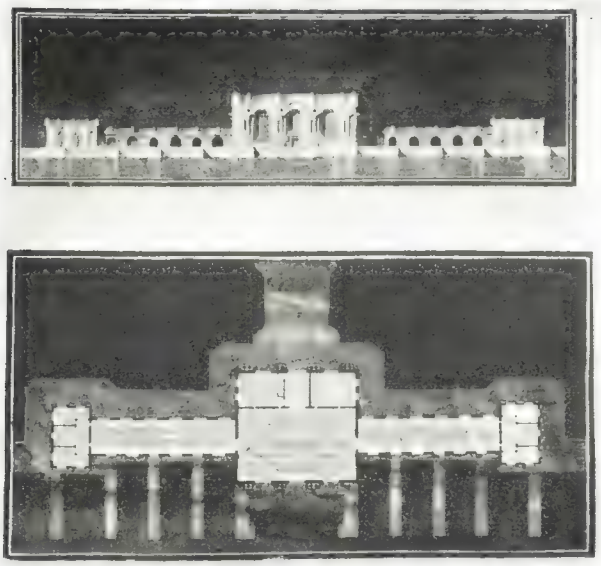
The first year of architectural drawing is not structural as would be expected. The writer believes that it is entirely feasible to approach the study of architectural elements immediately provided the course is preceded by a year of freehand drawing and ancient history which comes normally the first year in any of our courses. The work consists of a detailed study and drawing of the classic mouldings, both Greek and Roman, a study of the "Roman" orders, with simple problems in composition toward the end of the first semester. Ten hours per week is the minimum time required and many spend fifteen.

The second semester is concerned with shades and shadows, perspective and rendering. The shades and shadows are cast upon three of the order plates executed during the first semester. Each problem in shades and shadows is made a problem in rendering and presentation as well as one of mathematical shadow casting. The subject of shadows on the orders is approached with a number of preliminary plates involving the casting of shadows on elementary forms. The students have the advantage in this sunny climate of being able to do laboratory work with real forms at almost any time of the year.

It has been the procedure in other secondary schools to present the study of the orders later in the course, even as late as the senior year. Our experience has confirmed us in the belief that it can be done in the sophomore year under the conditions herewith set forth. The system of measurement used is that presented in Professor Ware's American Vignola but the student is trained to feel and visualize proportions rather than to depend upon rules and measurements.

The training in perspective, including problems in two-point, parallel and curvilinear perspective, leads up to a test plate consisting of the drawing and rendering of the perspective of a building from the working drawings furnished to the student.

The junior year is devoted entirely to construction, history of architecture, strength of materials and graphic statics. The drafting-room work embraces one semester of wood construction or carpentry drawing, including complete drawings for a frame residence, and one semester of masonry and metal construction. The drafting work is gauged to run parallel to the work in strength of materials so that the design may be preceded by the theory. Lectures are given on construction; excursions to building operations are made and reports are required. The reports are frequently prepared in connection with English composition work, both courses profiting by the



Senior Design for a Marine Station.

co-operation. The text used for the class work is the International Correspondence Schools Handbook of Building Trades, while Kidder's Building Construction and Superintendence, Kidder's Architect's Pocketbook, Martin's Details and other standard books are in the drafting room and library for use and reference. The department has a large collection of catalogs which with Sweet's Index, are called into use in connection with specification writing.

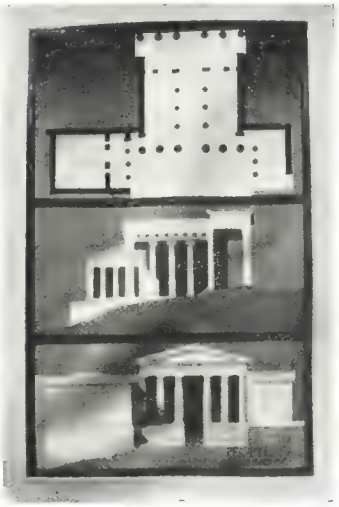
The work in Strength of Materials is based upon Merriman's Strength of Materials which is used as a text, with lectures on the materials of engineering, especial attention being paid to Pacific Coast materials and California woods and building products. The student is required to consult Government reports on woods, stone, etc., and is introduced to the general literature of the subject thru his library research. The second semester is devoted to graphic statics and the application of graphical methods to the solution of elementary engineering problems, including the more commonly used truss forms. Ricker, Kidder and others are consulted as references. All problems are checked by algebraic methods.

The history of architecture requires a year (five hours per week) and consists of lectures and quizzes upon the architecture of the world from the earliest times down to the present day. A year of history and a year of architectural drawing precede this course. The student prepares a notebook with sketches or tracings (two per week being required) illustrating the development of architecture to accompany his notes. Hamlin's History of Architecture is the official text but most of the standard works on the subject are at the disposal of the student in departmental, school and city libraries and the student is expected to take advantage of all of these sources. In this connection it is interesting to note the effect of this course upon the standard history courses of the school. It is the common testimony of history instructors that there is a much wider interest in history among the boys who have taken this course in "applied history." Students in architecture are constantly in demand for talks before the history classes and the "cultural gifts" of the various nations are thus brought to the attention of the ordinary history pupil. Co-operation between the art and history departments is complete and is exceedingly beneficial to both departments.

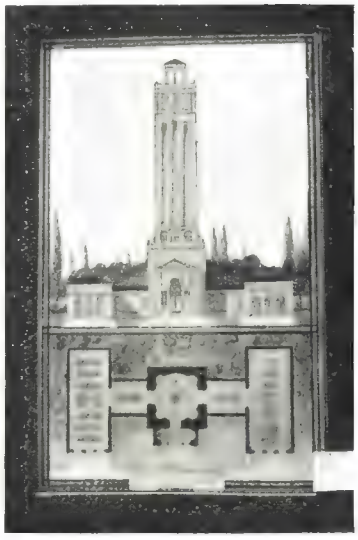
The fourth, or senior year, is almost entirely devoted to design, with lectures on requirements and planning, composition and design. All problems are individual, no attempt being made to keep the class together. The programs are written by the instructor, preliminary sketches being required at the end of two weeks. The finished drawings rendered in India ink, water color or other medium are limited in time depending upon the problem in hand. Before graduation a complete problem, rendered drawings, perspective and working drawings, of one considerable design is required.

The students in architecture maintain a club known as "Scarab" and during the year programs are given, exhibitions are held, trips are made to building operations, sketching trips to the old missions are taken and social times are indulged in.

The result from a practical and monetary standpoint, already repay the efforts and expenditure upon the part of school officials. In three years nearly 150 residences and other buildings have been designed and superintended by students of the department. Boys at the end of the second year have earned $18 per week in architects' offices, and one boy at the end of his Junior year was retained for eight months at a salary of $22 per week. At the end of this time he returned to school to continue his studies. Nearly all of the students who do not go to college go into practical work upon graduation. During the summer vacation many of the students work for contractors and carpenters while a larger number go into architects' offices. It is believed that with results of this nature it must be concluded that architectural work can safely be introduced into the secondary schools of the country.



HISTORIC RESEARCH.
Junior Year.



A CAMPANILE.
Junior Design.

DOMESTIC ART IN THE GRADES

Ada Gause, Pratt Institute, Brooklyn

(Third Article)

Fig. 6. Cooking Apron.

FOLLOWING outline shows: (1) Sixteen lesson periods of one and one-half hours.

(2) Amount of work to be done each period.

(3) Steps in construction.

(4) Lesson subjects, and the points to be emphasized.

Materials:

Longcloth, light weight, 44 inches wide. Cambric or nainsook.

Fig. 7. Cooking Apron Draft.

II. Drafting pattern:

1. Illustrate on board. See Fig. 7.
2. Demonstrate taking measure for the draft.
3. Children to take measures, working in pairs.
4. Each child draft pattern to her own measure.

Lesson II.

I. Drafting pattern—continued.

1. Finish draft.

FIG. 6. COOKING APRON.

Thread number 90.

Needles number 9.

Lesson I.

I. Introductory talk:

1. Exhibit finished cooking apron.
2. Talk on suitable materials.
3. Use of cooking apron; endeavor to create in the child a desire for a work apron.
4. Show how this model could be developed in different materials and used for other purposes.

2. Test draft.
3. Cut pattern.
4. Fit pattern.

Lesson III.

I. Cutting Apron:

Note.—This is the child's first use of a pattern, too much precaution cannot be taken in the correct use of it.

1. Rules for placing patterns and cutting materials:

a. Warp thread always the way of greatest strain.

b. Broad end of pattern at end of material, observe all other rules for economy.

c. Hold sheers close to table.
d. Cut with long even strokes.
e. Cut close to pattern.

Note.—If extra width of cloth is necessary, place and pin extra piece in place before pattern is removed. Give special attention to joining on extra piece.

Lesson IV.

I. Joining extra piece.
II. Place ¼ inch hem on edge.
III. Review, hems and bastings.

Note.—Give special attention to round corners.

Lesson V.

I. Review the hemming stitch.
II. Working period.
1. Place hemming stitch on apron.

Lesson VI.

I. Working period—hemming continued.

Note.—Good opportunity for the teacher to keep the class interested in "Textiles" either reading or talk.

Instructions to class:

1. Practice combination stitch.
2. Sew the facing with combination stitch on line of basting.

Lesson X.

I. Continue Lesson IX.
II. "Textiles," talk or reading.

Lesson XI.

I. Finish facing.
1. Remove bastings.
2. Turn facing to wrong side.
3. Crease on seam line and baste near crease with even bastings. Emphasize the importance of so doing. Give application.
4. Turn under edge of facing one-quarter inch and baste in place with the basting which is always used in such places.

Lesson XII.

I. Finish facing.

Note.—Class decide stitch to be used. (Vertical hemming stitch.)

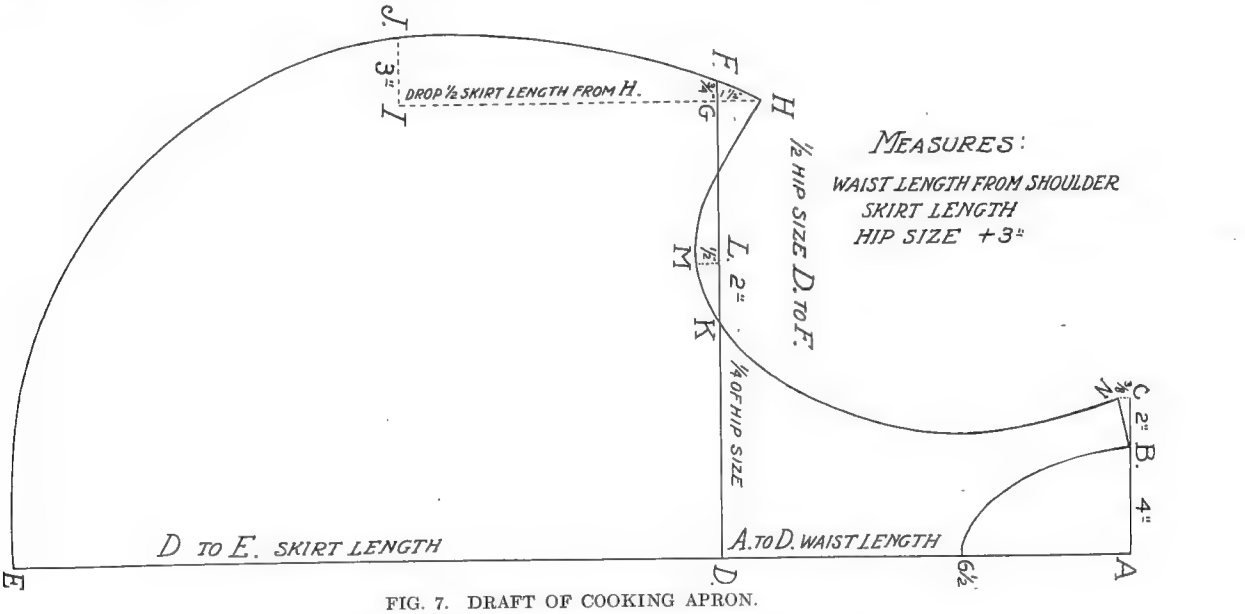


FIG. 7. DRAFT OF COOKING APRON.

Lesson VII.

I. Continue Lesson VI—if necessary, to finish hems.

Note.—It is during working periods that the children acquire skill and fix habits.

Lesson VIII.

I. Bias strips and join:

Demonstrate the following:

1. Meaning of "Bias."
2. Cutting and joining a bias.

Instructions to class:

1. Cut 1 inch bias facing for neck and under arm curves.
2. Pin and baste facing in place, ¼ inch seam with even bastings.

Lesson IX.

I. Combination stitch:
a. Review; Ref. Lesson on Sewing Bag. Illustrate combination stitch.
b. Strength, compared to other stitches.
c. Uses.

Lesson XIII.

I. Shoulder straps.

Measurements:

1. Length from shoulder to waist in back, plus 3 inches on warp thread.
2. Twice the width of apron shoulder plus one-half inch on woof thread.

Placing straps:

1. Begin at neck side of apron shoulder, allow one-quarter inch extension on strap.
2. Pin, and baste in place.

Lesson XIV.

I. Finish straps.
1. Stitch shoulder seams with stitching stitch. Why?
2. Turn free side-edge one-quarter inch, also shoulder extensions.
3. Place turned edges of strap together—pin, and baste, also baste across shoulder.

4. Lower end of strap cut in point—turn in edges one-quarter inch and baste.

Lesson XV.

1. Review overhanding. Ref. Paint Bag and Book Cover lessons.

II. Over-hand strap edge around point, and to shoulder.

III. Hem across shoulder.

Lesson XVI.

I. Review button-hole.

1. Practice button-hole.

2. Make button-holes, one in each point.

II. Review sewing on button.

1. Sew on buttons—one either side at waist line, 2 inches from sides of apron.

Household linen outline, planned for the Sixth Grade, could be best worked out on the school linen used in Domestic Science Department, as the materials are too expensive to be furnished by the school board. It embraces:

1. Making of household linens.
2. Initial embroidery.
3. Hem-stitching.
4. Simple crochet.
5. Mending linen.
6. Textile study.

"BRICKLAYING---AN INDUSTRIAL ART"

Wm. T. Gohn

(Seventh Article)

Arches.

AN arch is a structure composed of wedge-shaped blocks arranged to transport a load by lateral pressure thru the blocks to supports at each end of the arch.

Arches span openings in a stronger manner than is possible with a lintel, and frequently with a more desirable architectural effect.

Fig. 1 illustrates the various constructive parts of a segmental arch. The names and definitions of the parts of an arch are as follows:

1. *Abutment:* The masonry which supports an arch at each end, so designed that it resists the lateral thrust of the arch.

2. *Chord:* The straight line drawn from either springing line to the center of the soffit of the key.

3. *Crown:* The highest part of an arch ring.

4. *Extrados:* The upper and outer surfaces of the voussoirs, which compose the arch ring.

5. *Fallback:* The horizontal distance between the springing line and a vertical line dropped from the upper and outer point of the skewback.

6. *Haunch:* That portion of an arch which is between the crown and skewback. Altho there is no definite portion of the arch ring to which this term applies, it is generally given to that portion which is approximately half-way between the crown and the skewback.

7. *Intrados:* The inner or lower surface of an arch.

8. *Key:* The voussoir placed at the center or crown of an arch ring.

9. *Load:* That portion of masonry directly supported by the arch.

10. *Radius:* That distance taken from the springing line to a point on the center line, from which the arches are swung to form either the intrados or extrados of the arch.

11. *Rise:* The vertical height of the soffit of the key above the plane of the skewbacks.

12. *Skewback:* The top course of stone or terra cotta, or courses of brick on the abutments. The upper surfaces are usually cut to such an angle that the cut surface (or line of skewback) is approximately perpendicular to the thrust of the arch.

13. *Soffit:* The inner or lower surface of a single voussoir.

14. *Spandrel:* That portion of the load directly over the haunches.

15. *Span:* The horizontal distance between the two springing lines of an arch.

16. *Springer:* The first brick or block in the arch ring, next to the skewback.

17. *Springing line:* The upper and inner edge of the abutments.

18. *Voussoirs:* The blocks of terra cotta or brick forming an arch ring.

Kinds of Arches.

Arches are classified chiefly according to their forms or contours; the name being determined by the curve of the intrados. They are also classified according to the manner of construction. The general forms of arches in common use are: Segmental, semi-circular, elliptical, circular or bull's-eye, flat or jack, camber, two-centered Gothic, increasing Gothic, four-centered Gothic or Tudor, and Moorish or horse-shoe. (For outlines of the above named arches see illustrations, Figs. 2 to 12 inclusive.)

According to the manner of construction, arches are termed "ring" and "bonded" arches; "rough" and "gauged" arches; "relieving" arches; and "stilted" arches.

"Ring" arches are those in which the bricks are laid in concentric circles or arcs. They are usually known to the trade as "row-lock" arches. (See Fig. 13.) "Bonded" arches are those having not only the face of the arch showing the bricks to be bonded or tied together, but the arch thruout has a proper bond. (See Fig. 14.)

"Rough" arches are those built of brick in their (Fig. 15) regular shape or form, which requires that the

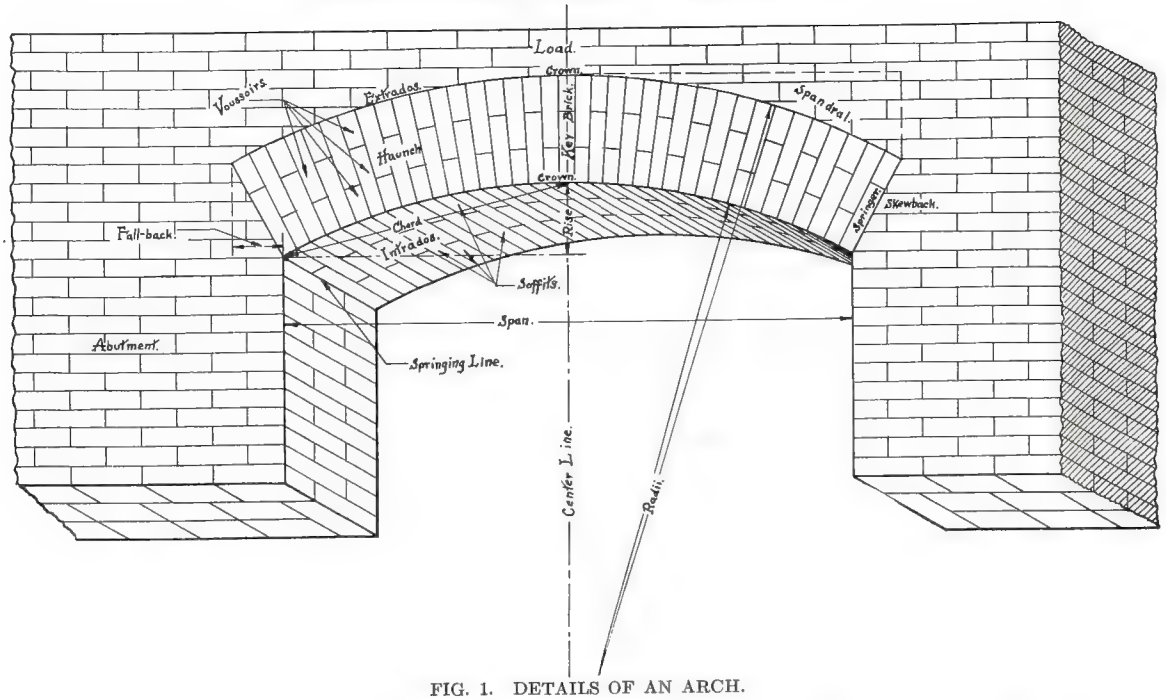


FIG. 1. DETAILS OF AN ARCH.

mortar joints be larger on the extrados than on the intrados. "Gauged" arches are those built of brick, which are cut to an exact (Fig. 15) size and shape to conform to the curve of the arch and radiating to the same center. A gauged arch should have joints of uniform thickness thruout. Figure 15 illustrates both methods of construction.

Where lintels are used to span openings in walls, and where a very heavy load is built around them, "relieving arches are generally built in just above the lintel to relieve it of strain; hence the name. They are seldom used in face work except where an architectural effect is desired. The Moorish arch in Fig. 12 is of this type. Their most frequent use, however, is on the inside of the building, over door and window openings. (See Fig. 16.)

An arch of some desired form spans the opening (Fig. 16) on the face of the wall, while the opening on the inside of the wall is first bridged with a wooden lintel, over which the relieving arch is turned. The lintel should be of sufficient length to permit a bearing of at least four inches on each jamb.

"Relieving" arches of the latter type are usually segmental in form. The span of the arch should be equal to the length of the lintel. A brick "center" is usually built on top of the lintel, the curve being obtained by a segment, furnished by the carpenter. In the construction of relieving arches, great care should be exercised to build the arch and the abutments more solidly than the "center" between the lintel and the arch.

All arches spanning openings, with the exception of relieving arches, are constructed on a temporary wooden framework called the "centering," which carries the weight of the arch during the construction. (See Fig. 17.) The "centering" is removed after the arch has been properly "keyed" and the mortar thoroly set.

"Stilted" arches are those whose center, from (Fig. 17) which the radii are drawn, is elevated above the springing lines of the arch. Moorish arches are of this type, altho other forms of arches can be so constructed. (See Fig. 12.)

In the construction of the various arches, great care must be exercised to construct substantial piers or abutments, with true and neatly cut skewbacks. Next, the "centering" should be of the proper size and shape,

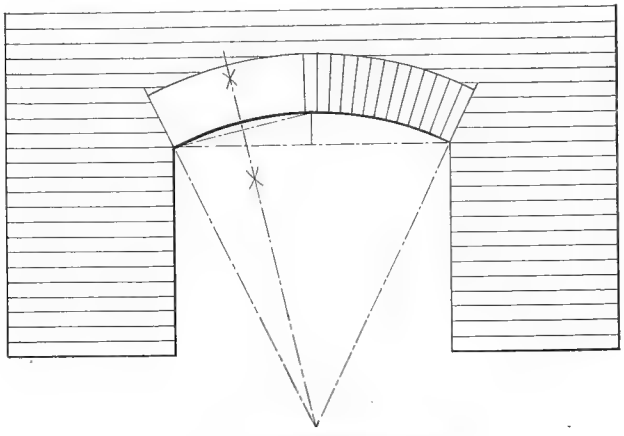


FIG. 2. SEGMENTAL ARCH.

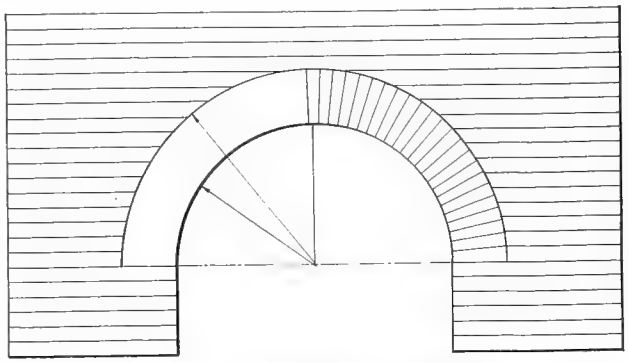


FIG. 3. SEMI-CIRCULAR ARCH.

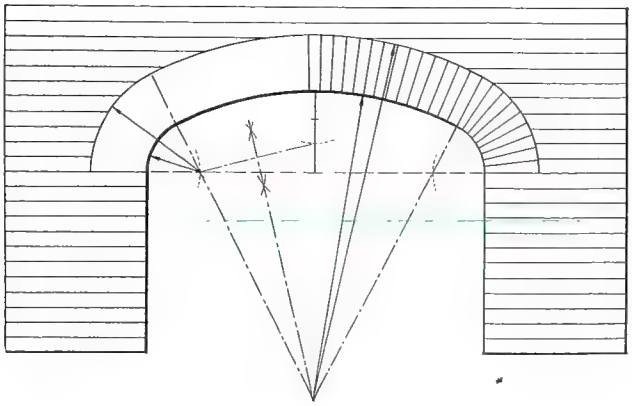


Fig. 4. Elliptical Arch.

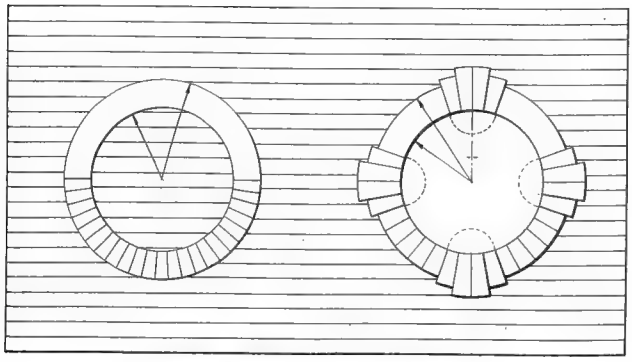


Fig. 5. Circular or Bull's-Eye Arch.

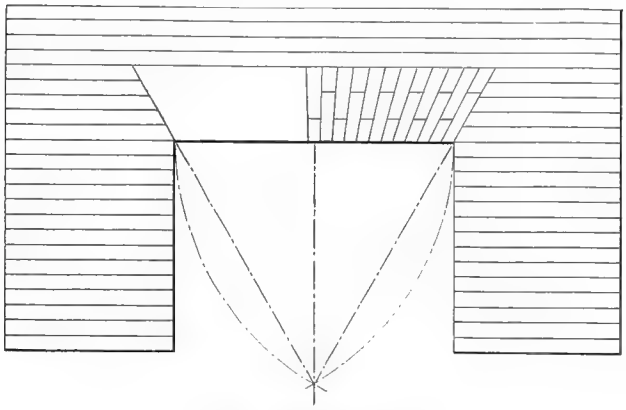


Fig. 6. Flat or Joist Arch.

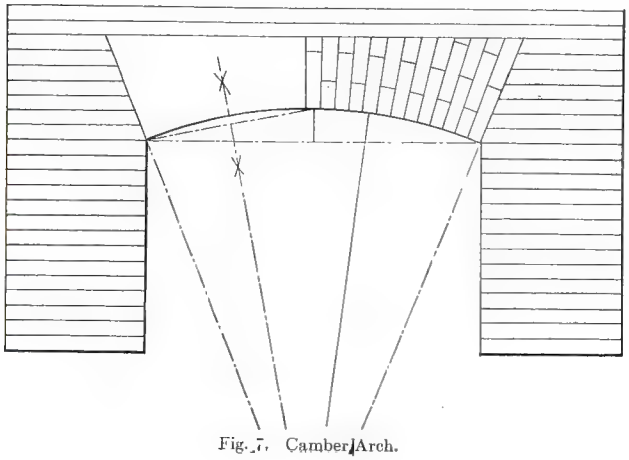


Fig. 7. Camber Arch.

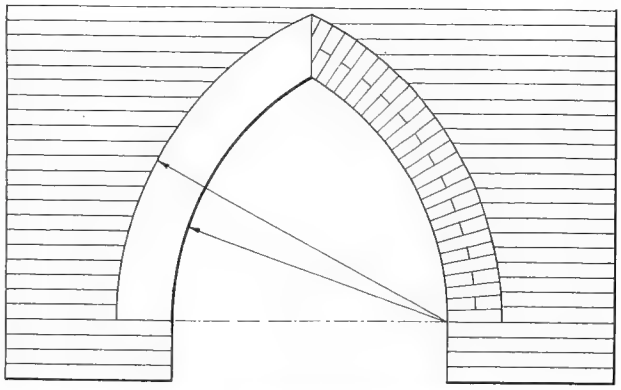


Fig. 8. Two-Centered Gothic Arch.

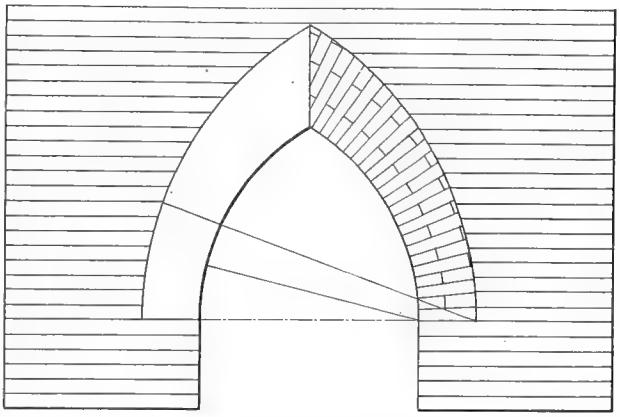


Fig. 9. Increasing Gothic Arch.

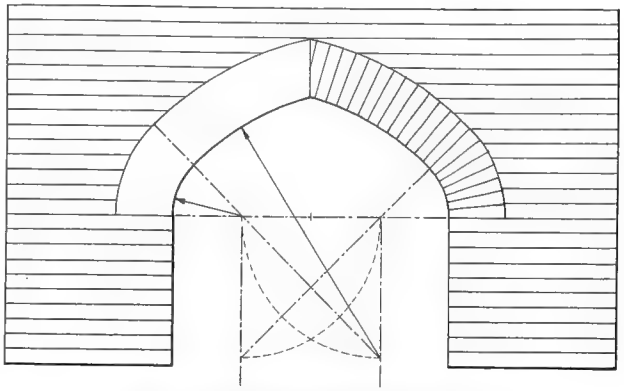


Fig. 10. Four-Centered Gothic or Tudor Arch.

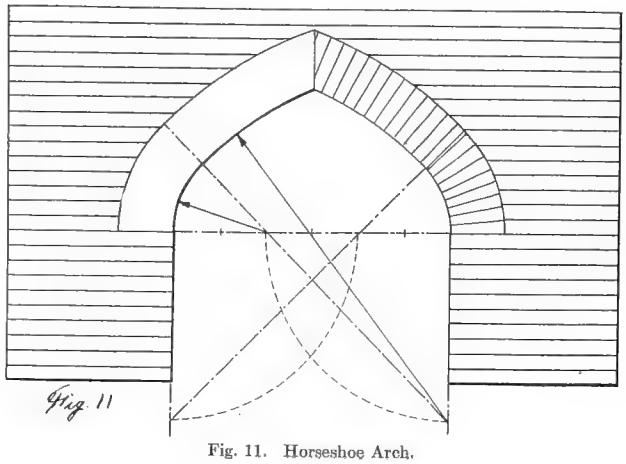


Fig. 11. Horseshoe Arch.

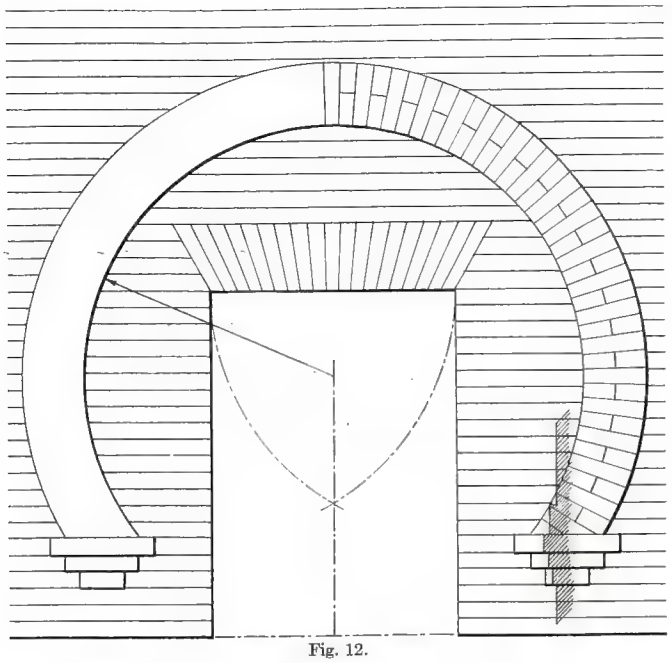


Fig. 12.

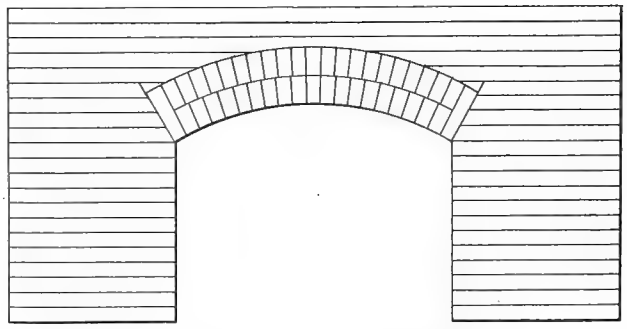


Fig. 13. Segmental Row-Lock Arch.

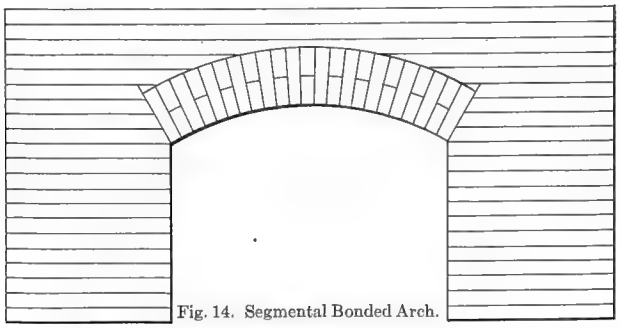


Fig. 14. Segmental Bonded Arch.

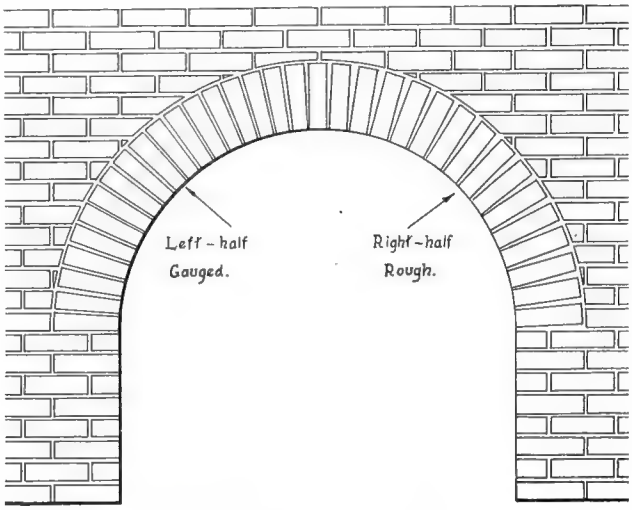


Fig. 15.

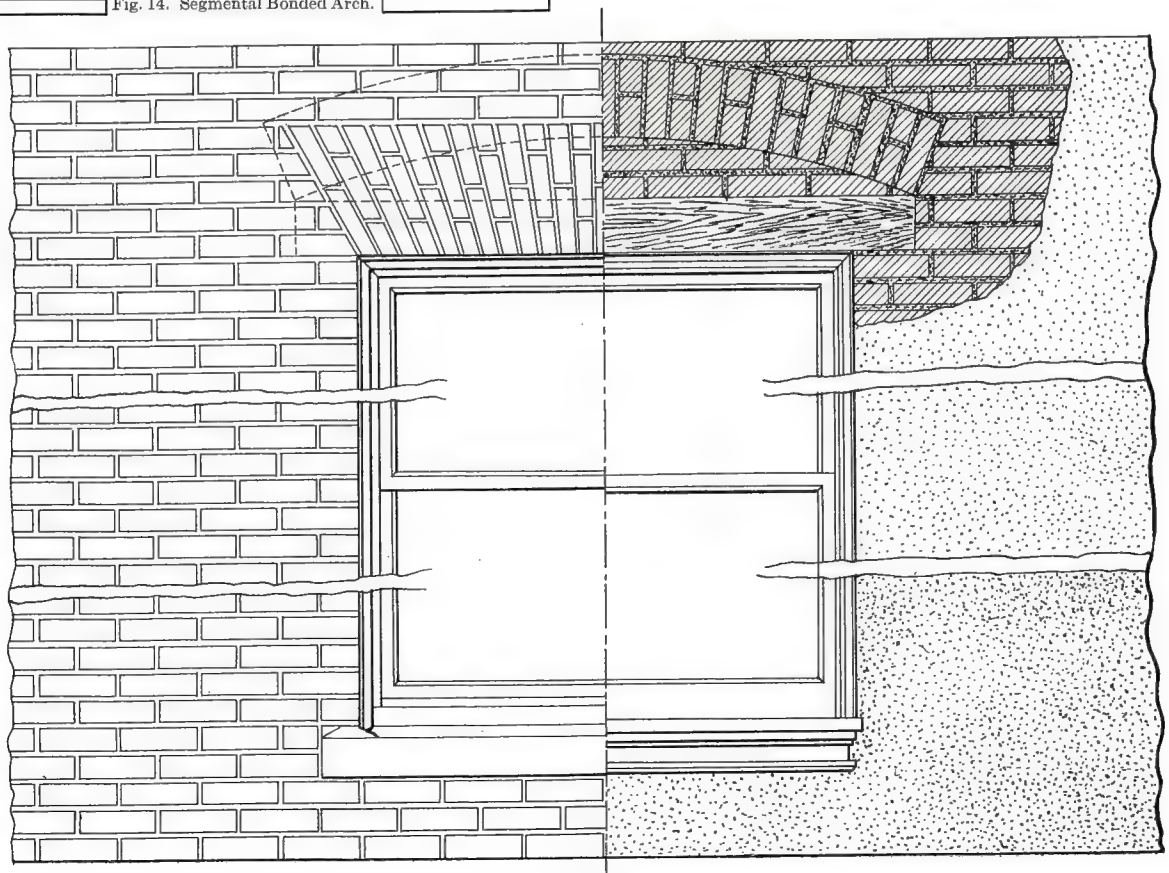


Fig. 16.

and of sufficient strength to carry the arch during construction.

After the centering has been properly placed in position, begin the construction of the arch and be careful to carry the work evenly, i. e., the work on either side should not progress more rapidly than the other.

All bonded arches should contain an odd number of courses and should be neatly and tightly keyed at the crown. In fact all arches should be neatly and tightly keyed.

Most important of all work done in connection with arch construction, is the "cutting over" the arch after it has been keyed. Neat cutting over often redeems a poorly turned arch, yet this should not suffice to repeatedly turn a poor arch.

The arch should be loaded equally as the work progresses over each "spandrel," and the courses of brick should be kept a trifle high in cutting over to allow for settling, and should gradually be brought to a straight and level line some distance above the key.

In recent years when arches of large size are to be gauged, or where there are sufficient arches in the complete structure to warrant its practice, it is customary to order the brick cut and ground to the proper size in the brick yard. When such is the case, a detailed drawing of the arch, with a quarter-inch drawing of the entire facade, should accompany the order. The following measurements should be plainly marked on the detailed drawings:

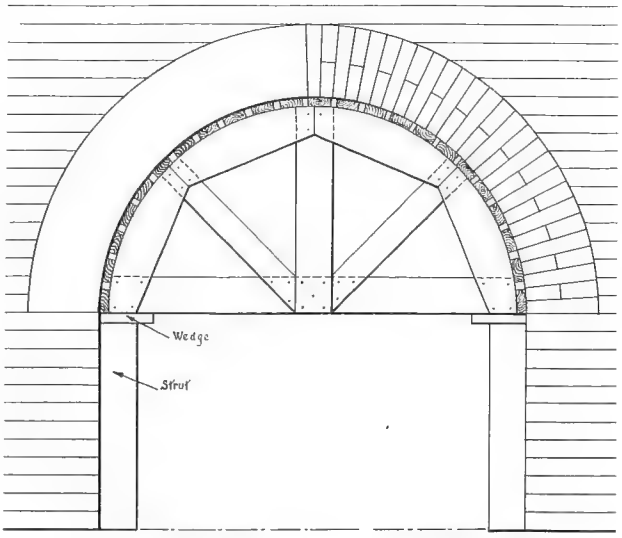


Fig. 17.

1. Span of arch. 2. Depth of soffit. 3. Height of face of arch. 4. Location of center and length of radius. 5. Size of key, if to be of other material than brick; and the fallback in inches.

FIG. 402. INCEPTIVE AXES. (See Page 73).

INDUSTRIAL ARTS DESIGN

Surface Enrichment of Large Primary Masses in Base and Precious Metals

Wm. H. Varnum, University of Wisconsin

(Article 13)

THE surface enrichment of small primary masses treated in Article 12 emphasized the designer's tendency for *full* surface enrichment of small areas. Such treatment has proved satisfactory because the eye can readily and immediately observe and comprehend or assimilate an enrichment upon a small area. For larger enriched areas considered in this article, full surface enrichment becomes a questionable policy for the following reasons:

It is true that the old time craftsman with consummate skill fully enriched large surfaces, but two factors interfere with this mode of treatment today. The first factor is the decidedly practical nature of the problem. The service to which the modern industrial project is put, interferes with the use of full surface enrichment. The second is the lack of skill on the part of the modern amateur designer. It is a sound policy to avoid the ornateness that frequently accompanies a large and unskillfully planned area. In place of this, under large masses we should limit the enrichment of large masses to a few salient areas which are well related to the structural lines.

These salient areas should determine the surface enrichment appropriate to the structure, so that the enrichment; 1, will lighten or soften necessarily heavy construction as in Figure 403; 2, support or apparently strengthen good structure, Figure 413; 3, add interest to large unbroken or otherwise uninteresting surfaces as illustrated in Figure 405. To aid in producing the desired results, we have the technical processes mentioned in Article 12 as follows: 1, Piercing; 2, Etching; 3, Chasing; 4, Enamelling; 5, Inlaying; 6, Stone-Setting; 7, Building; 8, Carving; 9, Planishing; 10, Frosting. On the plates for this article, the figure generally following the cut number refers to the process, as Figure 446,3.

Design Evolution.

A designer will be materially helped if he devotes a few moments of thought to his design problem before he applies the pencil to the paper. In the end, the time given to thinking out his problem will gain for him both increased excellence of design and rapidity of execution, provided his thinking is systematic. A sequential order of points to be observed are given below. The object of systematic thought is to form a mental picture of the project to be in full accord with the materials and construction and to be sympathetically related to the structural axes and to the contours.

(A) *Placing the Zone of Service.*

1. Where is the Zone of Service?

(B) *Classification of Form.*

2. Is the object flat, shallow and circular, low and cylindrical, high and cylindrical?

(C) *Placing Zone of Enrichment.*

3. Is the enrichment to be seen from above or from the side?

4. What point of the structure suggested by the form in (2) needs surface enrichment; is it the primary mass, appendages, terminals, links, details? Let the area selected become the Zone of Enrichment.

(D) *Amount of Enrichment.*

5. Will the enrichment cover the full surface, part surface (center or margin), or accented outline?

(E) *Location of Inceptive Axis.*

6. Is the Zone of Enrichment associated with a square, rectangle, hexagon or irregularly shaped flat plane; circular or cylindrical surface?

7. How should the Inceptive Axis be placed in the Zone of Enrichment to harmonize with the structural forms suggested by (6) and the point from which it is viewed (3)? See the violation of this latter point in Figure 439. Presumably this Inceptive Axis will be a vertical center line, horizontal center line, diagonal, diameter, radius, the element of a cylinder, or a dynamic curve for a free border.

(F) *Point of Concentration.*

8. Where should the Point of Concentration be located upon the Inceptive Axis?

(G) *Unison of Enrichment and Materials.*

9. What decorative process will be adaptable to service, the material and the contemplated design?

(H) *Type of Units.*

10. What design units are suited to the process selected in G, appropriate to the texture and structural lines of the form to be enriched and to its ultimate service? Choice may be made from nature, geometric pattern or historic ornament.

The above points may all be *thought out.* Now, with some assurance, the designer may take his pencil and begin to *draw* the units in their proper position upon or about the Inceptive Axis with the Point of Concentration correctly placed in position in the Inceptive Axis. Rules and suggestions for this execution have been previously given.

(I) *Designing of the Units.*

11. How should the units be drawn to be in harmony with the Inceptive Axis, the Contours and to each other?

The above points of approach to surface enrichment represents a logical reasoning process which supplies a line of sequential and developmental pictures that will reduce to a minimum the element of doubt and fog thru which the average designer approaches his problem. The steps will, in time, become practically automatic and may be thought out in a surprisingly short period of time.

Large Masses and Their Treatment.

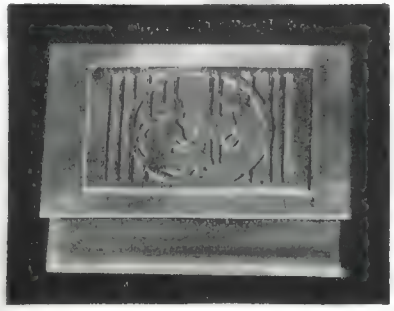
As may be expected from briefly considering the illustrations for this article as compared with those for small primary masses, Article 12, it is seen that the units for base and precious metals are larger and bolder than those used for smaller masses. The more effective designs are those whose appropriateness, simplicity and

· SURFACE ENRICHMENT OF LARGE PRIMARY MASSES IN PRECIOUS METALS · TREATMENT OF FLAT AND SEMI-FLAT SURFACES ·

WORK OF STUDENTS OF MILWAUKEE DOWNER COLLEGE

FIG·403· FORK AND STRAINER: ILLUSTRATING APPENDAGE TERMINAL ENRICHMENT · PROCESS · 1·

FIG·404· NOTE RELATION OF INITIAL "W" TO CONTOUR · 6·7·8·

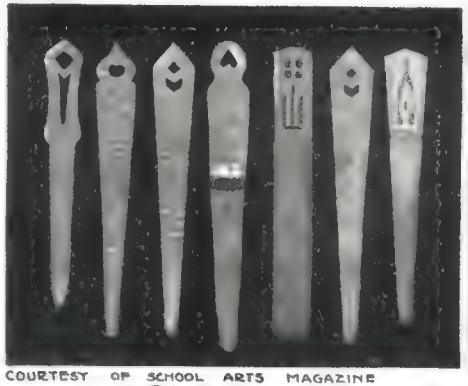


FIG·405· FULL SURFACE ENRICHMENT: P·C· IN CENTER· 1·

FIG·406· A AND B REPRESENT CENTER ENRICHMENT · 1·7·

PLATE 50.

· SURFACE ENRICHMENT OF LARGE PRIMARY MASSES IN BASE METALS · · TREATMENT OF FLAT AND SEMI-FLAT SURFACES ·



COURTEST OF SCHOOL ARTS MAGAZINE

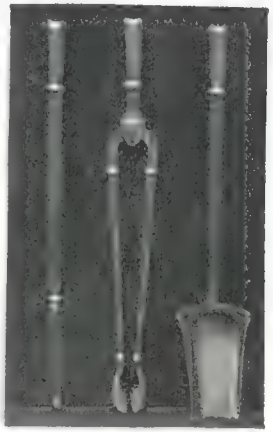
FIG·407· 1·4· · MAINLY TERMINAL

FIG·408· FIG·409· ENRICHMENT ·

FIG· 410 · 4·

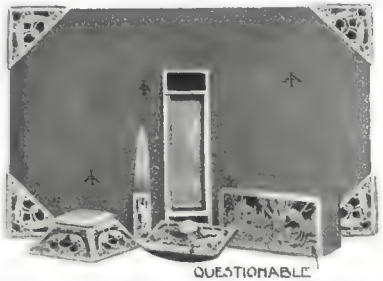
FIG · 411· 1·3·

FIG·412· 3· 4



FIG·413· 3·

FIG·414·



QUESTIONABLE

FIG·415·

FIG·416· PEACOCK MOTIVE APPLIED · 2·

PLATE 51.

· SURFACE ENRICHMENT OF LARGE PRIMARY MASSES IN BASE METAL ·
· TREATMENT OF FLAT PLANES IN CAST BRONZE ·

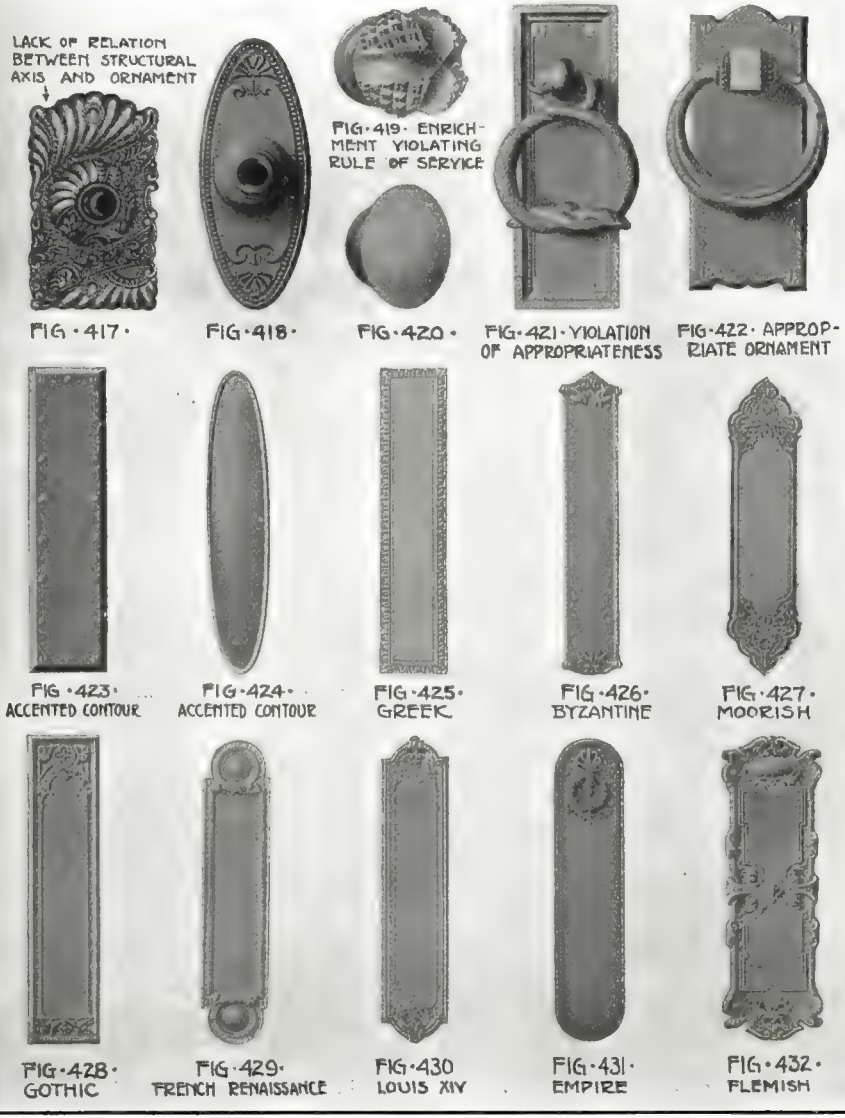


PLATE 52.

· SURFACE ENRICHMENT OF LARGE PRIMARY MASSES IN BASE AND PRECIOUS METAL ·
· TREATMENT OF SHALLOW CIRCULAR FORMS ·

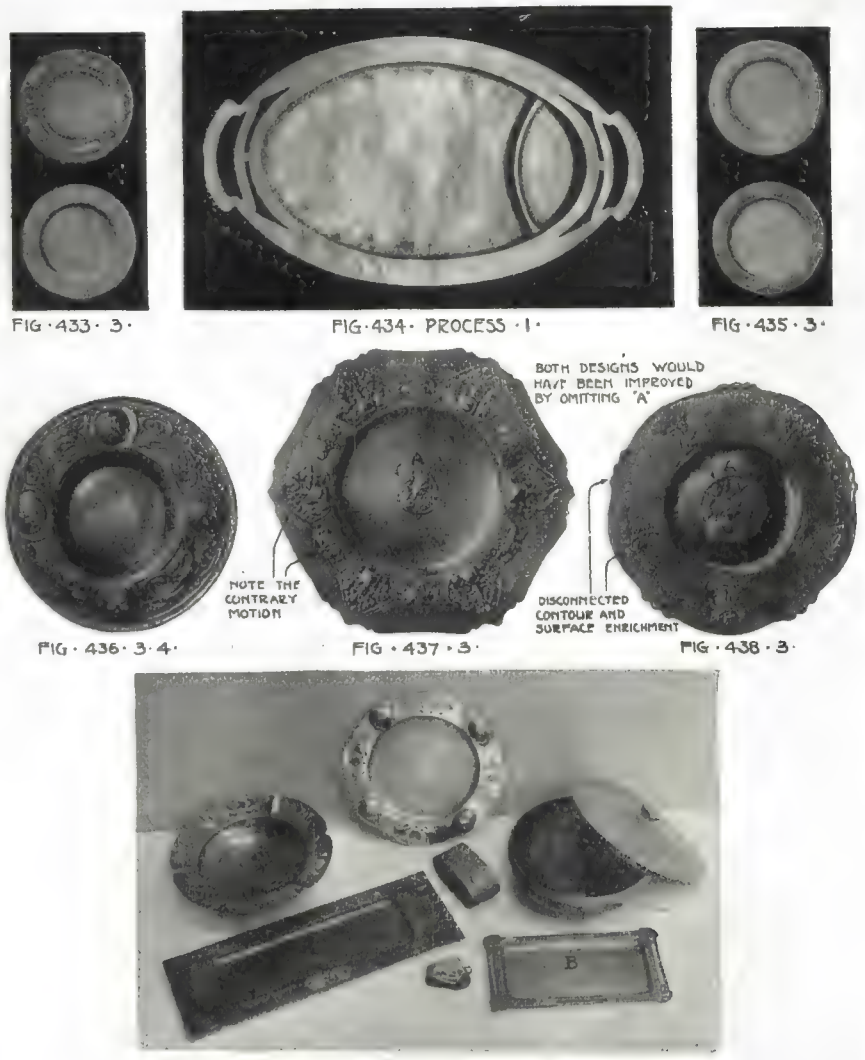


PLATE 53.

· SURFACE ENRICHMENT OF LARGE PRIMARY MASSES IN BASE AND PRECIOUS METAL · TREATMENT OF LOW CIRCULAR FORMS ·

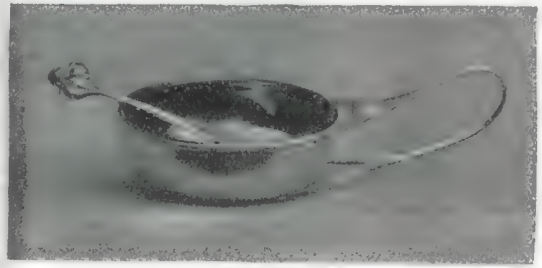


FIG · 440 · ENRICHMENT OF APPENDAGE · 6

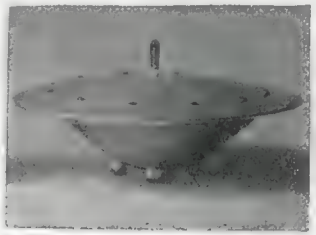


FIG · 441 · 6 ·

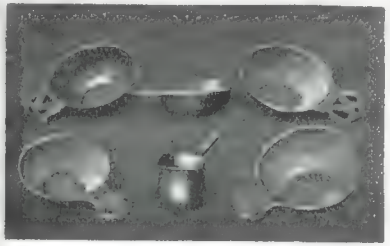


FIG · 442 · 1 ·
ENRICHMENT OF APPENDAGE

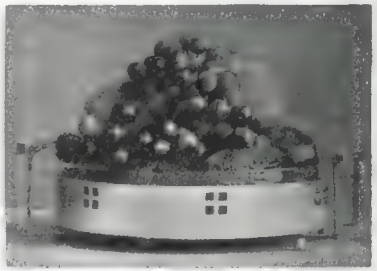


FIG · 443 · 1 ·
ENRICHMENT OF PRIMARY MASS

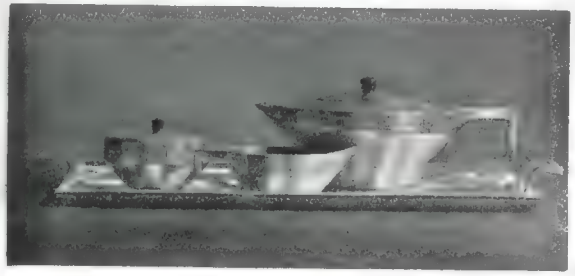


FIG · 444 · 3 · MARGINAL ENRICHMENT

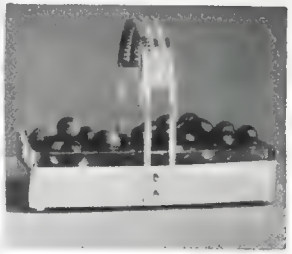


FIG · 445 · 3 ·

PLATE 54.

SURFACE ENRICHMENT OF LARGE PRIMARY MASSES IN BASE AND PRECIOUS METALS · TREATMENT OF HIGH CYLINDRICAL FORMS ·

FIG · 446 · 3 ·

FIG · 447 · 7 ·

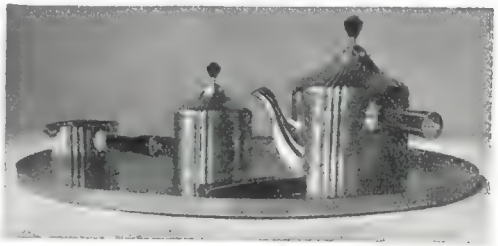


FIG · 448 · VERTICAL CHASED ENRICHMENT · 3 ·

FIG · 449 · 3 ·

FIG · 450 · NOTE THE FACT THAT THE ENRICHMENT ON BASE IS SUBORDINATED TO THAT OF THE SHADE ·

FIG · 431 · MAINLY CONTOUR ENRICHMENT

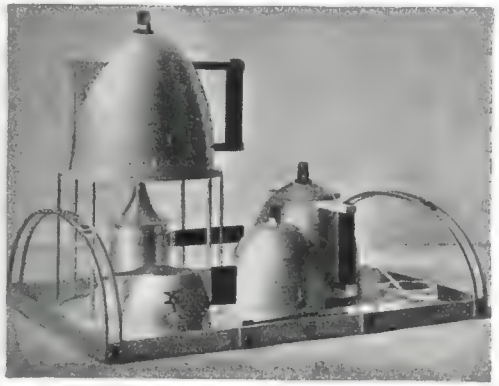


FIG · 452 · ILLUSTRATING THE "ECHOING" OF A MOTIVE
THE SYMBOL "X" SHOULD BE IN THE UPPER PORTION OF THE P·M·

FIG · 453 · 6 ·

PLATE 55.

correct structural relations appeal to our sense of fitness and beauty.

Flat and Semi-Flat Surfaces in Precious Metal. Plate 50.

Figures 403,4 and 6 are composed of projects designed mainly on vertical inceptive axes or center lines. The freely balanced natural units in Figure 403 have the zone of enrichment in the upper portion of the appendage (handles), and the point of concentration in the upper portion of the zone of enrichment. Formal symmetrical balance controls the placing of enrichment in Figure 404. Initial letters, thru lack of consideration of design principles, are frequently misplaced on masses with little or no consideration given to their mass relations with the structural contours. As a contrast to this, notice the carefully considered relations between the letter "W" on the tea strainer in Figure 404 and its adaptation to the contours of the appendage. The stone enrichment on the handle of the paper cutter in Figure 404 in no way interferes with its use as a cutter and is therefore appropriate as surface enrichment.

The pierced enrichment of the silver box in Figure 405 contains vertical and horizontal lines which bring the decorative human figures into harmonious relation with the structural contours. Figure 406 shows both formal and free balance with center and full surface zones of enrichment. C and D could have been improved by a more strongly marked point of concentration which would have added more character to the designs.

Flat and Semi-Flat Surfaces in Base Metal. Plate 51.

The Terminal as an Enrichment Zone.

In Article 7, page 13, the contour terminal enrichment problem was described at some length. Many illustrations on Plates 50, 51 and 52 are in a way, similar in their type of surface decoration which is termed *surface terminal enrichment.* The "happy ending" mentioned in Article 7 as a suitable means of terminating the contour of a long primary mass or appendage may be similarly treated by suitable surface enrichment, particularly shown in Figures 403, 4, 7, 8, 9 and 10. The terminal is quite common as a zone of enrichment.

It is readily seen that when surface enrichment is the prevailing decorative theme, it becomes necessary to subordinate contour enrichment to it (Rule 10b), otherwise the strife for dominance arising between these two forms of enrichment will lead to poor and ornate design, (Figure 417). Whatever contour enrichment is used must be chosen to accord with the surface enrichment (Rule 10d) as noted in the preceding figures and in Figure 411. Here we find the closest connection, as the chased forms of the surface at many points merge into the contour. Thus surface and contour are bound together in unity with the surface enrichment, which maintains its dominance thruout.

The simple and dignified treatment of the fire set in Figure 413 is synonymous with the finest type of enrichment for service and beauty (Rule 11b). The peacock motives of Figures 414 and 415 are applied to the desk set (Frost Arts and Crafts Company). The motives as used in this case are generally well adapted to their respective areas and inceptive axes.

Surface Enrichment of Hardware. Plate 52.

Figure 417 is a typical example of over ornamentation with the surface and contour enrichment struggling in deadly conflict for prominence. In the combat, the natural structural axis has been totally neglected for irrelevant and disconnected ornament. Figure 418 illustrates correctly related surface ornament, with a dominance of the latter form (Rule 10b). Figure 419 represents a type of decoration presumably roughened to meet the needs of service. It proves however, to be unpleasant to the touch and unnecessary as the plain knob is preferable in every way (Bostulate). The naturalistic snake motive of Figure 421 is repulsive to many people; this and similar decorative motives should be avoided in preference to the more conventionalized pattern of Figure 422 (Rule 11f).

Historic Ornament Applied to Period Hardware Designs. Door Plates. Rule 11e.

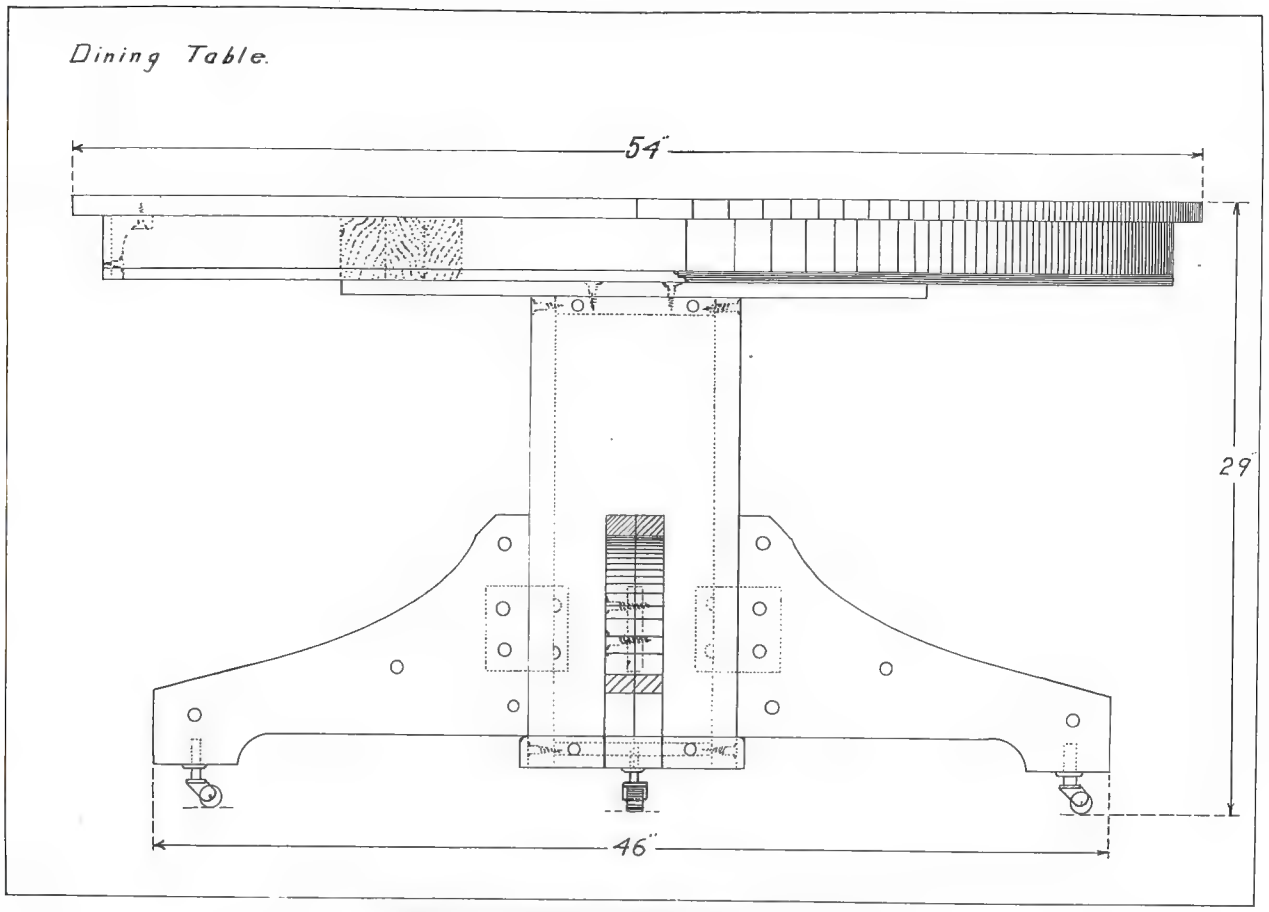
It is impossible to close these articles without reference to the influence of the great schools of architectural history upon contemporary design. There is a growing tendency for manufacturers to use period patterns in house decorations which correspond to the design of the building. A Colonial building frequently calls for Colonial hardware, a Gothic church for corresponding surface enrichment of that period.

As introductory figures, 423 stands as a simple example of accented (beveled) contour while 424 has been accented with reminiscent moulding appropriate to Colonial architecture. They might, however, be used with many simply designed articles of furniture. From this slight indication or portion of a style, we have a more pronounced beginning in Design 425 with its clearly marked Greek egg and dart ornamental border. The acanthus leaf of the Byzantine school (Figure 426) changes to the geometric arabesques of the Moorish school in Figure 427. The Gothic arch, cusps and quatrefoil of Figure 428 are changed to the classic acanthus foliage of the French Renaissance period, Figure 429. Figures 430 and 431 are later developments of the Renaissance. The heavily enriched Flemish pattern completes our illustrations of the use of past forms of ornamentation applied to modern designs and only shows a small number from a rapidly enlarging field of period design.

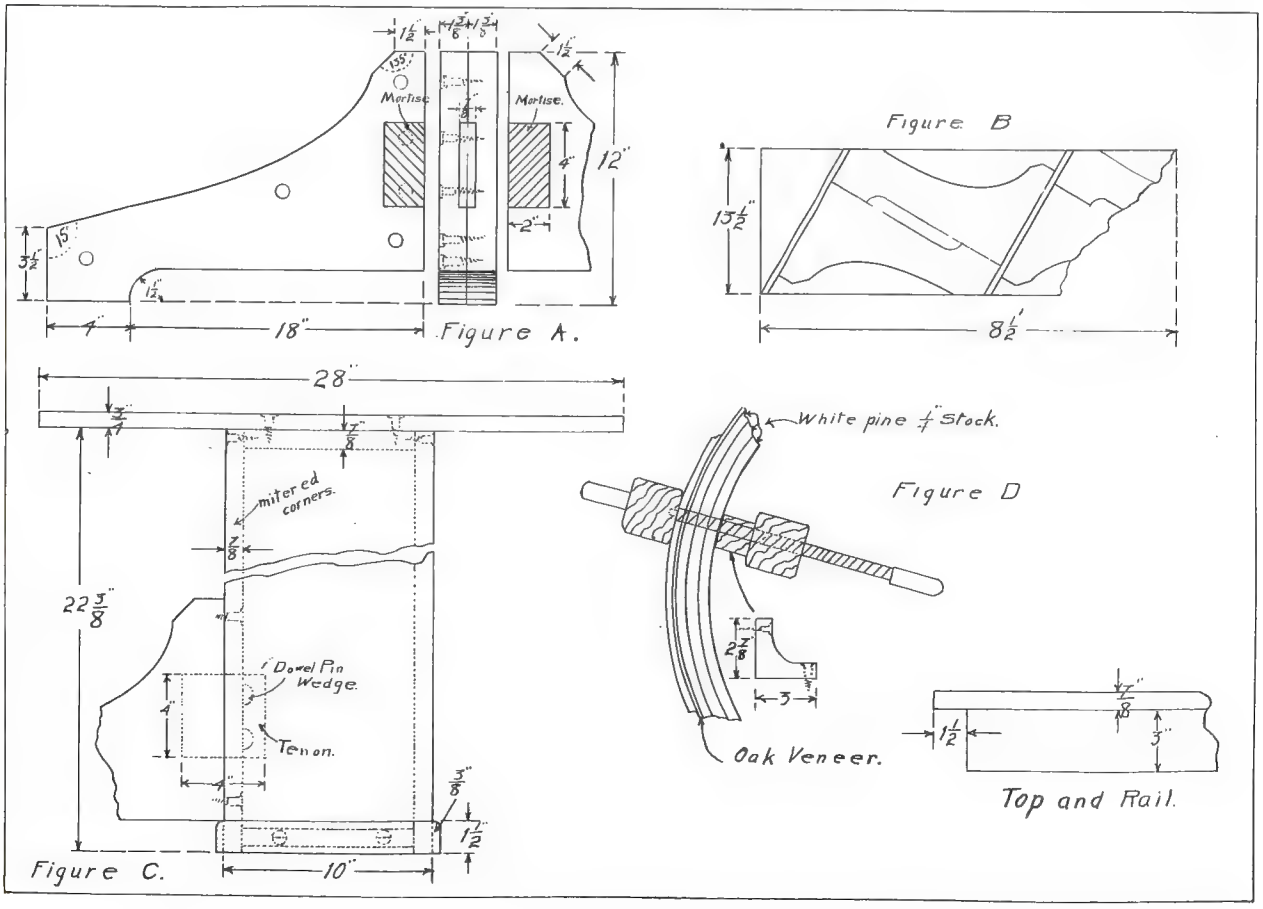
Shallow Circular Forms. Plate 53.

With circular plates and trays, the enrichment normally takes the form of a border (marginal enrichment), with the inceptive axes or center lines of the repeated units radiating from the center of the circle,—Figures 433, 5, 6, 7, 8, 9. An elliptical form frequently calls for handles and terminal enrichment as shown by Figure 434.

Both Figures 437 and 438 have divided points of concentration and would be materially improved by the omission of the center unit "A." The small tree used as a connecting link in the border of Figure 437 should be reversed as it now possesses a motion or growth contrary to the larger tree units. The contour enrichment in Figure 438 could well be omitted or moved around to support the surface enrichment. The pierced enrichment "A," Figure 439 is incorrectly used as it is not



DETAILS OF DINING ROOM TABLE. See Page 83.



PROBLEMS AND PROJECTS

THE Department of Problems and Projects, which is a regular feature of the INDUSTRIAL-ARTS MAGAZINE, presents each month a wide variety of class and shop projects in the Industrial Arts.

Beginning with January 1, 1916, the Magazine will award a monthly prize of $10 for a meritorious problem used in the Department. This is not a prize contest in the ordinary sense. Every problem accepted for publication will be paid for. The prize will be simply a reward of merit.

From the material submitted by readers, the Editors will select each month for the award one problem of especial merit, judged from such standpoints as originality, good construction, artistic merit, adaptability to school work, and quality of drawings and photographs submitted.

The brief description of constructed problems should be accompanied by a good working drawing and a good photograph. The originals of the problems in drawing, design, etc., should be sent.

Problems in *benchwork*, *machine shop practice*, *turning*, *patternmaking*, *sewing*, *millinery*, *forging*, *cooking*, *jewelry*, *bookbinding*, *basketry*, *pottery*, *leather work*, *cement work*, *foundry work*, and other lines of industrial-arts work are eligible for consideration.

Drawings and manuscripts should be mailed flat and should be addressed:

The Editors, INDUSTRIAL-ARTS MAGAZINE,
Milwaukee, Wis.

A DINING-ROOM TABLE.

A. Clifford Tagg, Rock Island, Ill.

FOR the high-school boy taking advanced manual training there is no woodworking project that will make a stronger test of his ability and knowledge of the subject than a round top dining-room table. Much may also be gained from a financial standpoint. The table here shown should not cost more than twelve dollars to construct; and the market price will vary from thirty to fifty dollars, depending largely upon the finish and kind of wood used.

It is better to have but four casters on this table, leaving the pedestal to be supported clear of the floor by the four feet. A support of any kind in the center is very apt to make the table rock, and it will be hard to move. This may be avoided by using the construction here shown. The feet should be cut from a plank 9′ long by 13½″ wide by 1⅜″ thick, and the grain should be straight and clear. The worker will find it easier to first make a pattern from cardboard and then mark out the feet. (Fig. B.) After the pieces have been cut out on the band saw they should be divided into pairs. The grain in the two pieces should not run parallel. Fasten a pair together, temporarily, with hand screws, and joint the backs, squaring the bottoms to them. The inside surface of each pair should next be trued to form a glue joint. They should be made a little concave which will insure a tight joint along the edges. Before the two pieces are glued together the mortise should be cut. The notches which form the mortise are marked out from the back, on the inside surface. (Fig. A.) This mortise cannot be worked after the two pieces are put together, as it is in the end grain. Five No. 12 gauge screws as well as glue should be used in building up each foot, the heads of the screws to be covered by turned plugs. Tighten the joints along the edges of the pieces with hand screws. A block 4″x4″x⅞″ is fitted into the mortise of each foot, to form a tenon. (Fig. C.)

The pedestal is 22⅜″ high and 10″ square with mitered corners. Thru mortises are cut in the four sides for the tenons of the feet. (Fig. C.) The keyed mortise and tenon joint is used to a good advantage here. The feet are fastened to the sides before the pedestal is assembled.

The rail of this table is built up of ¼″ white pine strips faced with quartered oak veneer. (Fig. D.) Saw six strips 3″ wide and 41″ long and the thickness given above, leaving the side that is to be glued with a rough saw kerf. Cut out sixteen blocks 3″ by 2⅞″ and the shape shown in Fig. D. With compass points set at a radius of 25½″, strike a semi-circle on the floor. Divide it into sixteen equal parts and at each point screw a block to the floor. Hand screws are used to hold the wood in place while the glue is drying. (Fig. D.)

This form can be made in any size and shape and will make curved veneer work in the manual training shop much easier. Hot glue should be used and it is well to heat the wood before gluing. It will be easier to use a 2″ paint brush in applying the glue. Lay the pine strips and the oak veneer near the form with the side to be glued up. Enough glue should be put on the one side of each piece to cover the surface it is to be glued to. The pieces must be rubbed together before they are clamped to the form. A facer of pine ¼″ thick should be placed outside the oak veneer to protect it from the hand screws and to insure a good smooth surface. (Fig. D.)

In clamping the rail to the form, it is better to start in the center and work both ways to the end. The rail should be allowed to dry in the clamps from three to four days and as much longer as possible. The blocks used in making the form can be used to fasten the rail to the table.

As this is an extension table there will be two parts to the top. Each side is built up of ⅞″ stock not to exceed 5⅝″ in width. The dowel pin joint is the best to use in a top of this size. To insure tight joints on the outer edges and for convenience in clamping, it will be better not to cut the top round until the sides are taken out of the clamps, and the top has been scraped and sanded.

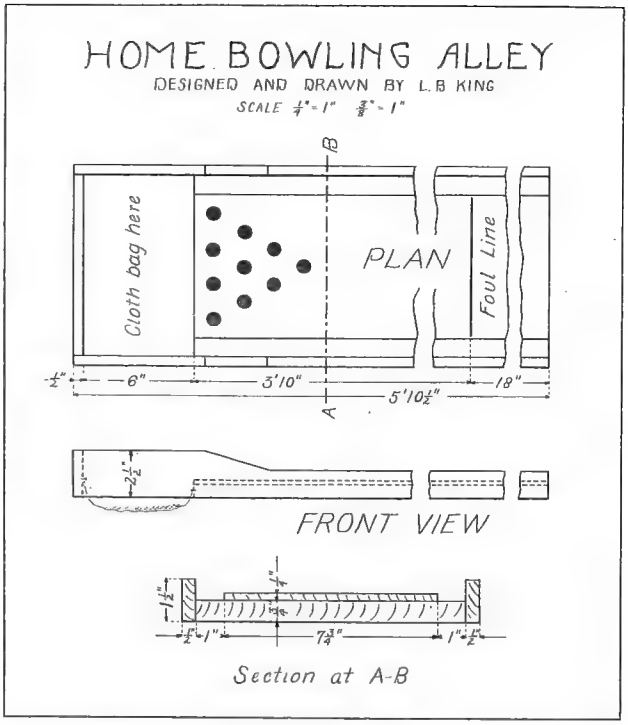
A SMALL BOWLING ALLEY.

L. B. King, Canton, Ill.

BOWLING ALLEYS, such as the one shown in the accompanying drawing and photograph, have proven an acceptable problem for manual training classes in woodworking. In addition, the game played with them furnishes sustained amusement for both old and young, and a large demand for the alleys has arisen among our pupils.

Designed and Made in the Rock Island High School.

The Bowling Alley in Use.



The alley shown was designed to accommodate the sets of ten pins found in the five- and ten-cent stores thruout the country. The pins are 5" in height, with a diameter of about $\frac{7}{8}$", and retail for ten cents. As the width of the alley is determined by the size of the pins, they should be procured before construction work is begun. The corner pins in the back row should be so located that they will not be displaced when the balls ($1\frac{1}{2}$" diameter) roll down either gutter. The corner pins located, the location of the other pins presents no difficulties. Experiments have shown that the lengths indicated on the drawing made the game one of reasonable difficulty, and also of a convenient size for a dining room table. Any shortening of dimensions should be in the distance between the first or "king pin," and the foul line.

The alley floor may be $\frac{1}{4}$" oak glued and nailed to $\frac{3}{4}$" poplar, or similar wood, or $\frac{7}{8}$" stock may be grooved to form the gutters. A cloth bag added as indicated in the drawing, makes a convenient "pit" for receiving pins and balls. The runway for returning balls, while not essential, adds to the interest of the game, especially for younger players. The one shown was made from a piece of chalk trough. The incline should be slight, and the last third of the run on the level.

Play is carried on as on full sized alleys, and the manner of scoring may easily be learned from local bowlers. One person sets up pins and returns the balls, while one or more persons bowl. Any method of delivering the ball is permissible, but the hand must not cross the foul line, and the ball must not bound on the alley after crossing that line.

This problem is well adapted for woodworking pupils of varying ages, as it permits variety in methods of construction, and in kinds of finish. Its cost may be small, if desired, and the interest created seems to be general and permanent.

SERVING TRAY.

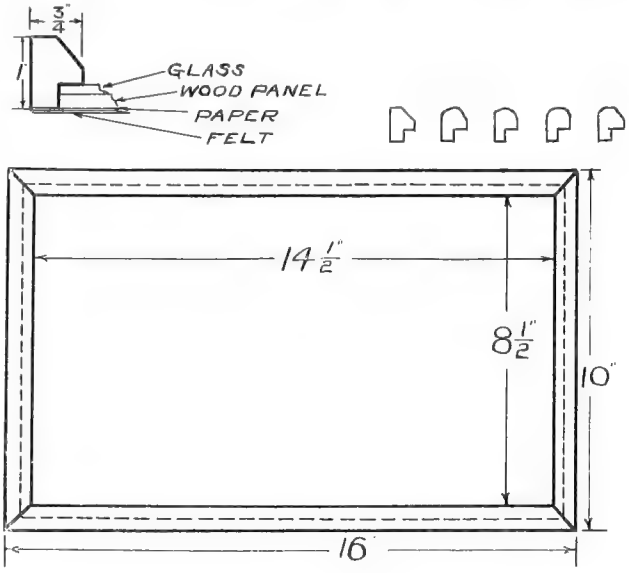
A. E. Jacobson, Manual Arts Department, Muskegon, Mich.

In the illustration, we see trays of three sizes and shapes—two rectangular and one oval.

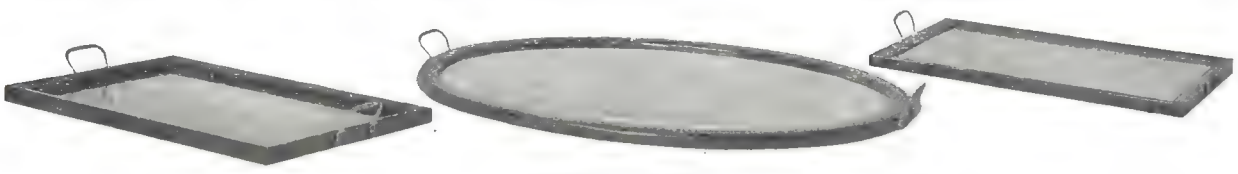
Mahogany or any of the other hardwoods make suitable materials for trays. Decide upon the size and shape and get out the stock for the frame proper.

Now, for the sides one may have a number of varied shapes as in mouldings. Work out the form desired and cut the stock to size—if the square or rectangular form is used, mitre the corners and fasten with hot glue and brads.

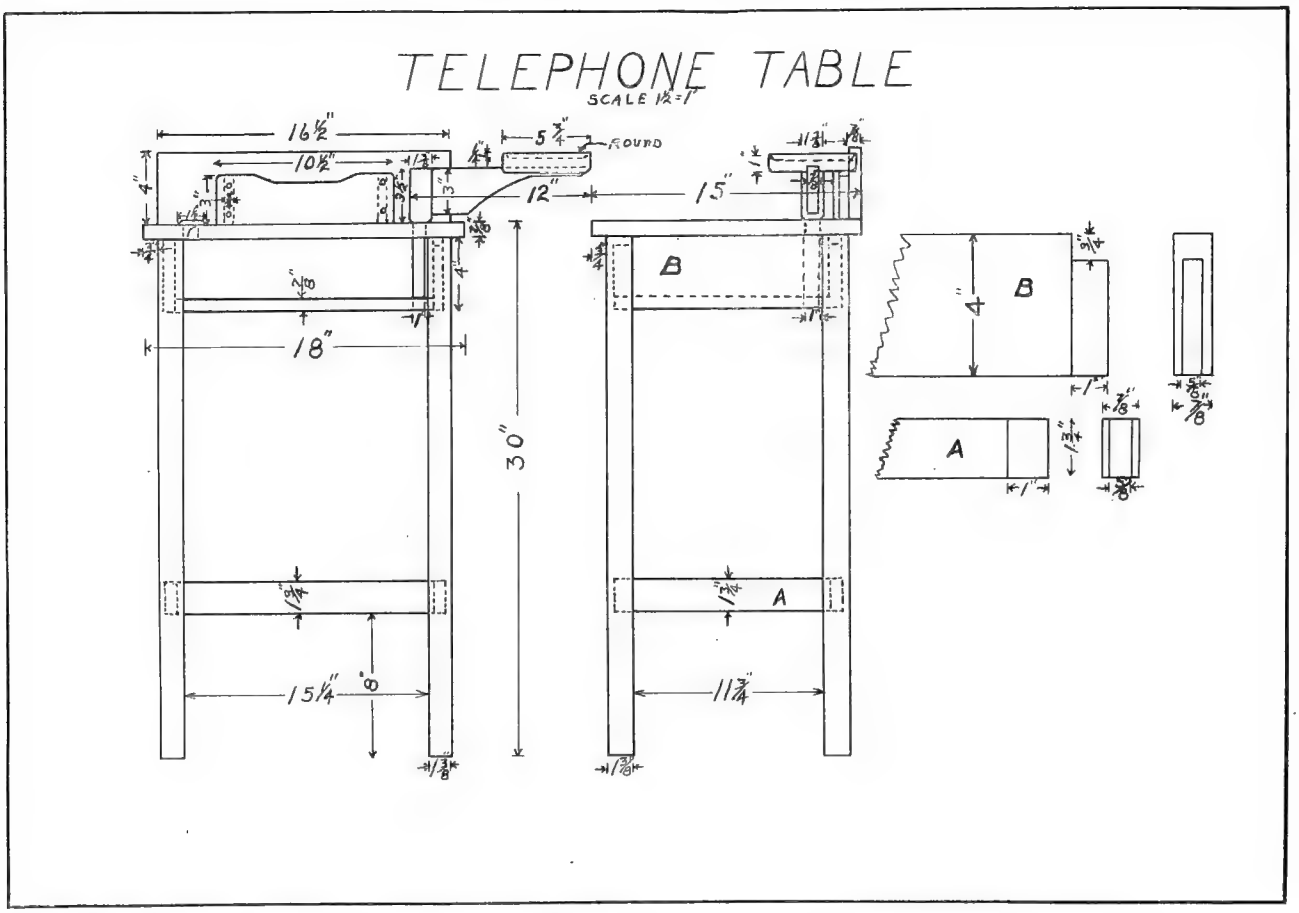
Before the frame is fastened together, two things must be taken into consideration—shall it be a plain panel or shall the panel be covered with glass? In many in-



Details of Serving Trays.



SERVING TRAYS.



stances, some style of tapestry is placed over the panel and the glass over this. A rabbet must be cut in the bottom and inside edges of the sides, so that the panel and glass, if glass is desired, can be inserted.

A three-ply panel is the proper material for the bottom as it will hold its shape without cracking when put to hard usage. A mahogany panel or a panel of any other suitable wood with sides to match works up nicely. Many of the furniture and veneer factories have these small panels which accumulate and which can be obtained at reasonable prices and will work up very satisfactorily in these trays.

In the oval tray, is brought forth the geometrical form, the ellipse. This ellipse can be worked out in Mechanical Drawing or in the shop by means of the two brads and string method.

The oval tray can be built up in segments or cut out of a solid piece—cutting the ellipse from a solid piece will be easier for the younger students. It is better to cut out the interior first. This can be done on a jig saw, or by hand with a compass saw.

After the inside is finished, the rabbet for inserting the panel should be cut—this is a little tedious to do by hand, but it can be finished in a short time if a routing machine is handy, one such as is used in a printing department for cutting out wood blocks.

Now comes the outside and the shaping of the sides. By forming the outside edges last, one is not so likely to break the frame as there is something with which to hold the tray in the vise. The panel is held in the tray by brads and over this is glued a piece of paper.

To protect the serving table or tea wagon, a piece of felt is fastened to the bottom of the tray—then there is no danger of scratching. The trays can be finished in any desired color.

Suitable handles can be purchased at a hardware store or from any companies manufacturing this material.

A TELEPHONE TABLE.

D. J. Lockwood, Louisville, Ky.

THIS telephone table of simple, tho attractive design, is a welcome addition in any home. Those of us who are used to having the wall phone or the desk telephone which is generally deposited on the window sill or the like will appreciate this table. The swinging arm at the right can be placed on the left side of the table in the hole made for same if this is desired. This allows full use of the table for writing yet the telephone is at all times accessible.

This problem was designed for use in the upper grades and in high school, preferably the latter. If it is made in a shop where there is no lathe, the round post on arm can be made of a one-inch dowell rod. If desired the shelf under the top can be made into a drawer. The details for a drawer of this kind are unneccessary to the present day shop teacher. This drawer will not only improve the looks and the utility of the table but will increase the number of processes for the student to work out.

If this problem is to be used in the upper grades and the mortise and tenon joint is considered too hard, the dowell rod joint will serve as well so far as the wear of the table is concerned. This form of joint is widely used in factory-made furniture. The table should be made of oak or chestnut, preferably the latter.

As to finish a good wax finish is preferred. For grade and high school work I have found the acid fume stain gives the best result. This is to be followed with one coat of thin shellac and a good grade of wax. This finish is not only easy and quick to apply—which is no small factor to be taken into consideration with a large class—but gives that beautiful nut-brown color which is so hard to get with other stains.

The stain I speak of is the Acid Fume Stain put up by The Marietta Paint & Color Co. It can be bought in all quantities, either from your local dealer or direct from the factory.

A MEDICINE CABINET.

Richard M. Van Gaasbeek, School of Science and Technology, Pratt Institute, Brooklyn, N. Y.

AMONG the articles completed in the carpenter shop of Pratt Institute by the elementary class, the one shown in the accompanying illustrations proved somewhat of a novelty and attracted considerable attention.

The medicine cabinet is a simple design, useful and inexpensive to make. It is made of white pine, enameled white. The working drawings were made by a student in the mechanical drawing department, while the student who constructed the cabinet made the shop layout, stock list, and the machine and bench work.

Frequent accidents caused by people getting up in the dark and selecting a bottle from the medicine closet which in their haste and the darkness proved to be the wrong bottle and a serious mistake, suggested making a separate compartment for poisons, shown in the illustration at (A).

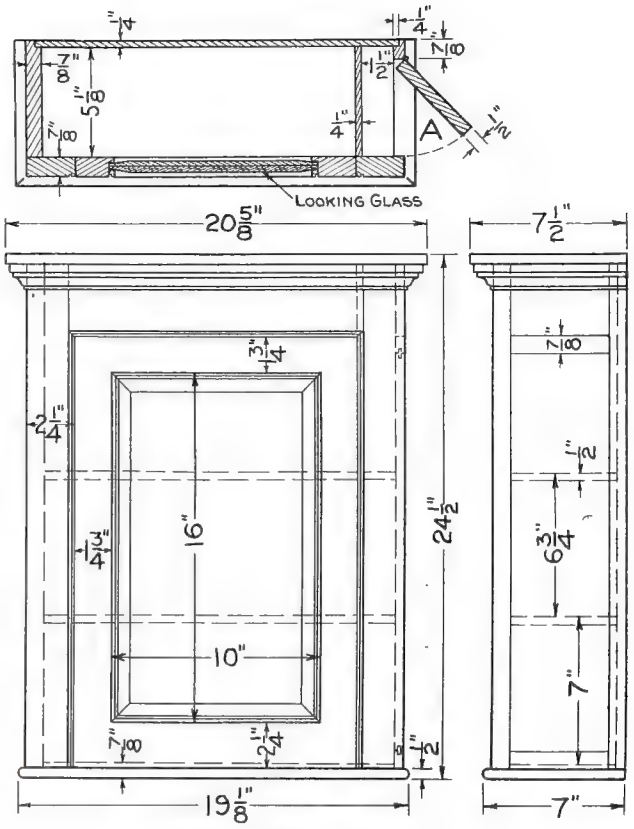
The side of the closet is made up of a false panel, cleated on both ends to prevent warping, while a ¼″ division running from top to bottom makes a compartment 1½″ deep, inside, which is large enough to hold any ordinary bottle of poison or drug that is not in frequent use.

Such bottles are thus kept from the hands of an innocent child in that the door leading to the poisons is not in its usual place; made up in one solid piece, it is deceptive, so that the child is not likely to find the bottle it ought not to have.

The cabinet is a splendid exercise in that its construction affords an opportunity to apply the mortise and tenon joint, long and short shoulder, rabbeting, dadoing, splines, mitreing panel and crown moulding, door fitting and putting on the hardware.

Stock List.

1 Side	⅞″	x 5⅜″	x 1′	11½″.
1 Bottom	⅞″	x 7″	x 1′	7⅛″.
2 Shelves	½″	x 5⅛″	x 1′	4¾″.
1 Top	½″	x 7½″	x 1′	8⅝″.
1 Partition	¼″	x 5⅛″	x 1′	11½″.
1 Back	¼″	x 18¾″	x 1′	11½″.
Frame.				
2 Stiles	⅞″	x 2¼″	x 1′	11½″.
1 Rail	⅞″	x 3½″	x 1′	1⅝″.
1 Stile	½″	x ⅞″	x 1′	11½″.
1 Rail	½″	x 3½″	x 1′	4½″.

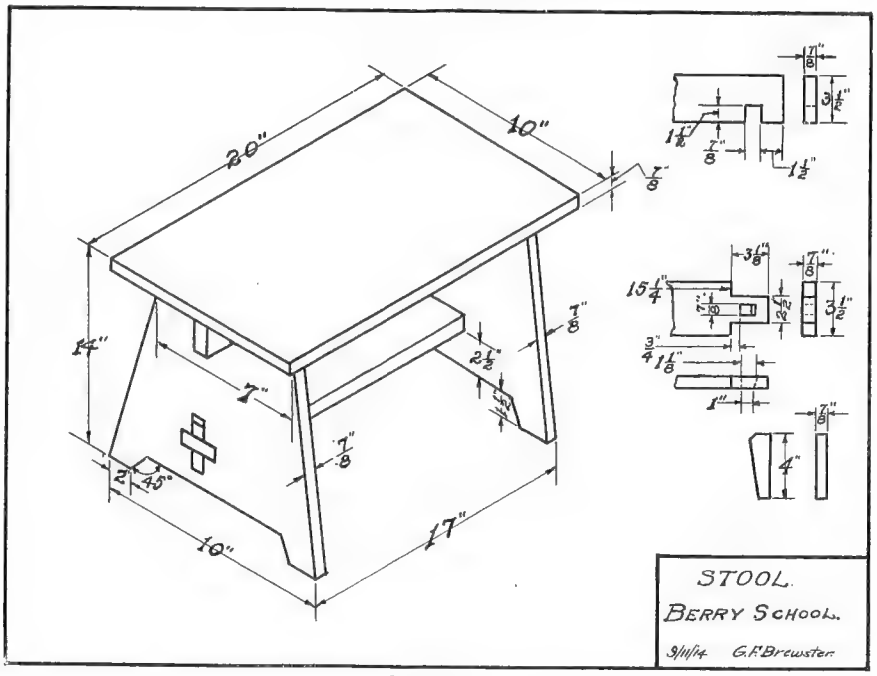


Details of Medicine Cabinet.

Doors.				
2 Stiles	⅞″	x 2″	x 1′	8¼″.
1 Rail	⅞″	x 2″	x	10 1/16″.
1 Rail	⅞″	x 2½″	x	10 1/16″.
1 Solid Panel.	1½″	x 4½″	x 1′	6½″.
2 End Cleats	½″	x ⅞″	x	4½″.
1 Back	¼″	x 10 1/16″	x	4 1/16″.

THE JANUARY PRIZE.

The January Prize of $10 for a meritorious problem has been awarded to Mr. L. Day Perry.



(See Page 87).

SAVING SCRAPS IN THE WOOD SHOP.

H. C. Givens, Pittsburg, Kans.

THE handling and rehandling of scrap material in school shops is today one of the disagreeable problems which every teacher of shopwork has to contend with. Many an instructor who would like to keep his shop in excellent shape is obliged to reserve some space for a scrap box and for piling small pieces which he has little occasion to use. This is difficult to keep in order and is an eye-sore to him. Often he would be justified in throwing much of this scrap away because of the extra work both for himself and pupils. He cannot do so, however, because he would be severely censured if he did. Saw-dust and shavings are likewise, in some cases, inconveniences to the janitor who would be glad to dispose of them in some other way than he is at present compelled to use.

STATE MANUAL TRAINING SCHOOL, PITTSBURG, KANS.

The above are not barns—they are the auditorium and classroom buildings erected to temporarily house classes until the plant of the Normal School which was destroyed by fire, is replaced by new and fireproof buildings.

At the State Manual Training Normal, Pittsburg, Kansas, there is a rather satisfactory method of handling much of this scrap. The larger pieces are surfaced and glued up for cores. The smaller material is passed thru a grinder. This reduces it to the state of fine sawdust which is used as a base for the preparation of floor sweep for the school. For the disposal of the balance of the scrap we are contemplating the installing of a chipper which will reduce it fine enough to be handled by the grinder.

For the benefit of others who may desire to dispose of their scrap in this way it is necessary to know that the essential factors in a floor sweep are, first, a medium for carrying oil to which the particles of dust may cling, second; that this substance must be of such a nature that the danger from spontaneous combustion is eliminated; or if not there must be added sufficient material of a nature such as will eliminate the danger of fire. Our best results have been secured by using crude oil and salt.

The experiment has been carried on long enough in this institution to show that if there is sufficient scrap available, and a corresponding need of floor sweep, the expense is justified.

THE NEGRO AND INDUSTRIAL EDUCATION.

THE Negro has as little present need of the skilled trades as the Esquimaux. He is circumscribed by social and commercial conditions as completely as the Esquimaux is surrounded by the frozen ranges of the North. The land, that is the farm, furnishes his only considerable chance to become a producer, and from the farm he must wring his sustenance, just as the denizens of the Arctics win their living from the ice fields. As between the two the advantage is with the former. The source of all the wealth of all the ages, is his for exploitation. The social order under which he lives makes this one decree: That he, like all the other peoples of the world must start at the beginning—with the soil.

If the Negro has but little use of the trades, they should be but little taught to him. Aside from the very promising results of his labor on the farm, he produces practically nothing. The artisan and professional element of the race is already too large in proportion to the producing element. To justify the large number of artisans among the race, we should have capital and combinations of capital.

I conceive that industrial schools for Negroes, besides their general educational provisions, which are usually good and adequate, should offer principally, training in agriculture and in the arts and sciences necessary to progressive farming and good husbandry. Work should be their fundamental aim; the farm, their chief objective. They should seek to produce good practical farmers, dairymen, and stock raisers, with knowledge of scientific principles. Each boy graduate should be able to build a barn, a corn-crib and a wagon bed. He should know how to construct a silo, erect a fence, concrete a cistern and tire a wheel. He should be able to temper, sharpen and adjust his implements.

Each girl graduate should have a little more domestic art and a little less domestic science. She should have a little more experience in the kitchen of the institution and a little less of laboratory cooking. She should be able to sew well and be required to make her own clothes—yes, and to launder them, too. First of all, she needs to be a good housewife and perchance a good servant, if that should be her lot. In all events let her be prepared to answer the stern call of Emergency. Many a colored girl has fallen because she could not get a school to teach, and because she had gone untutored in one of the great prime requisites of good young womanhood—domestic art.—*J. H. Lilley.*

A STOOL.

George F. Brewster, Mt. Berry, Ga.

YOU will note that this isometric drawing of the stool is not made to any definite scale, that there are enough dimensions on it so that those which are not given can be easily figured, that fractional dimensions are used largely, that this one project involves the use of two different kinds of joints.

My object in teaching woodwork is, of course, to give the boys a working knowledge of wood, also to train them so that they will have a working knowledge of arithmetic as applied to shop and construction problems.

ITEMS OF CURRENT INTEREST

CONFERENCE OF THE MANUAL ARTS.

DECEMBER 9, 10 and 11, there was held at the Chicago Normal College a conference of Manual Arts teachers. This conference was called by the Bureau of Education, Washington, D. C., and its meetings were presided over by Dr. W. T. Bawden, representing the Bureau.

There were present at the conference thirty-two directors of departments for the training of teachers of the Manual Arts. Thirteen states were represented in the conference as follows:

List of Members in Attendance.

Illinois—F. M. Leavitt, University of Chicago; O. L. McMurry, Chicago Normal College; G. A. Ross, Lewis Institute; L. W. Wahlstrom, Francis W. Parker School; S. J. Vaughn, State Normal School, De Kalb; A. C. Newell, State Normal University, Normal; C. A. Bennett, Bradley Polytechnic Institute, Peoria.

Indiana—J. L. Massena, Marion Normal Institute, Marion; M. L. Laubach, State Normal School, Terre Haute; H. F. Black, Valparaiso University, Valparaiso; M. E. O. Sink, Indiana State Normal School, Terre Haute.

Iowa—C. H. Bailey, State Teachers' College, Cedar Falls; R. C. Kelley, State University, Iowa City.

Kansas—H. H. Braucher, State Normal College, Emporia.

Michigan—G. S. Waite, State Normal School, Kalamazoo.

Minnesota—R. S. Southwith, University of Minnesota, Minneapolis.

Missouri—I. S. Griffith, University of Missouri, Columbia. August Ahrens, State Normal School, Warrensburg.

Nebraska—F. C. Smith, University of Nebraska, Lincoln.

Ohio—C. E. McLaughlin, State Normal College, Athens; C. S. Van Deusen, State Normal College, Kent; F. C. Whitcomb, Miami University, Oxford.

Pennsylvania—E. H. Smith, Carnegie Institute, Pittsburgh.

Tennessee—R. W. Selvidge, Peabody College, Nashville.

Texas—O. A. Hanzen, University of Texas, Austin; A. B. Mayo, Sam Houston Normal Institute, Huntsville; J. R. Coxen, State Normal School, San Marcos.

Wisconsin—F. D. Crawshaw, University of Wisconsin, Madison; G. F. Buxton, Stout Institute, Menomonie; W. H. Henderson, University of Wisconsin Extension Division, Milwaukee; V. M. Russell, State Normal School, Platteville.

As will be seen by reference to the program at the close of this article, many of the pressing and unsolved problems of manual, industrial and vocational education were considered. Timely and well prepared discussions of these topics were offered by the leaders after which the conference resolved itself into a kind of earnest, spirited, but good natured, free-for-all debate of the various points raised.

Several groups of men presented reports which were the results of long and careful investigations in certain fields. These proved to be of great interest and value.

The informality of the meetings, where the men sat closely about large tables, lends significance to the fact that the Bureau of Education calls the gathering a Conference. This is exactly what it was. The men conferred intimately and informally with one another and with the representative of the Bureau of Education.

While work was the key word, the social side was not entirely neglected. The conference was entertained at luncheon on two different occasions by the Household Arts Department of the Chicago Normal College. These were greatly enjoyed by all and delight was expressed on every hand at the entertainment received at the hands of President Owen, Mr. Oscar McMurry, head of the Department of Manual Arts, and Miss Snow, head of the Household Arts Department, all of Chicago Normal College. They and their many helpers are especially deserving of thanks for their thoughtfulness and courtesy in showing the members of the conference thru the various departments of their most interesting school.

It is worth mentioning, also, that the fact that all the men of the Conference stopped at the Del Prado Hotel added much to the pleasure and profit of the meeting. Under this arrangement the conference scarcely ceased at any time the discussion of the topics in hand.

At the conclusion of the program Saturday noon, a vote of thanks was extended to Commissioner Claxton for calling such a conference. A further expression was sent to the Commissioner commending the conference idea and asking that a similar meeting be called next year. It was decided to accept the invitation of Peabody College, Nashville, Tenn., to meet there next year, the last week in October.

Program.

Thursday Morning. Opening Address, President W. B. Owen, Chicago Normal College; "Problems of the U. S. Bureau of Education," W. T. Bawden.

Open discussion of problems of practice teaching in the manual arts; C. S. Van Deusen; S. J. Vaughn.

At noon the members of the Conference were guests of the Household Arts Department of the Normal College.

Thursday Afternoon. Business session.

Report of Committee on "Evaluation of Units Credit," as a basis for transfer of credits; F. D. Crawshaw, chairman.

Thursday Evening. Dinner at hotel, followed by open discussion of the possibilities of work in the manual arts and vocational education under the so-called Gary plan; G. S. Waite, H. F. Black, F. C. Whitcomb.

Friday Morning. Open discussion of definite standards for manual arts work, and means for testing the results of teaching; I. S. Griffith, C. H. Bailey, H. W. Schmidt.

Friday Afternoon. Open discussion: To what extent can existing well-equipped manual training departments in cities and larger towns meet the demands of vocational education programs? What important modifications are essential? Under what conditions is it desirable to attempt to meet the demands of vocational education and the manual arts with the same plant or equipment? A. B. Mays, R. C. Kelley, A. C. Newell.

Friday Evening. Dinner at hotel, followed by open discussion of the results of educational surveys in their relation to the manual arts; H. H. Braucher, A. Ahrens, G. E. McLaughlin, W. H. Henderson.

Saturday Morning. Business session.

The Conference resolved itself into three committees for the formulation of statements for further consideration and action by the Conference. Each member of the Conference was assigned to service on one committee.

1. Committee on Declaration of Principles; R. W. Selvidge, Chrm.
2. Committee on Terminology; F. M. Leavitt, Chrm.
3. Committee on Evaluation of Credits; F. D. Crawshaw, Chrm.

Consideration of Reports of Committees.

Summary of the deliberations of the Conference; C. A. Bennett.

THE MACHINERY OF THE PENNSYLVANIA CONTINUATION SCHOOLS.

THE operation of the new Pennsylvania child-labor law, with the first of January, has made necessary a complete system of forms and certificates for use in the schools and factories. The certificates reflect the administrative machinery which the state education department has devised for securing the observance of the law in all its important details.

Three preliminary certificates covering scholarship, health and age, are required before the final "working papers" can be issued by continuation school authorities as agents of the state department.

The certificate of scholarship is filled out by the teacher. To be acceptable, it must show that the child has had the equivalent of a sixth grade education and that he has completed the required studies.

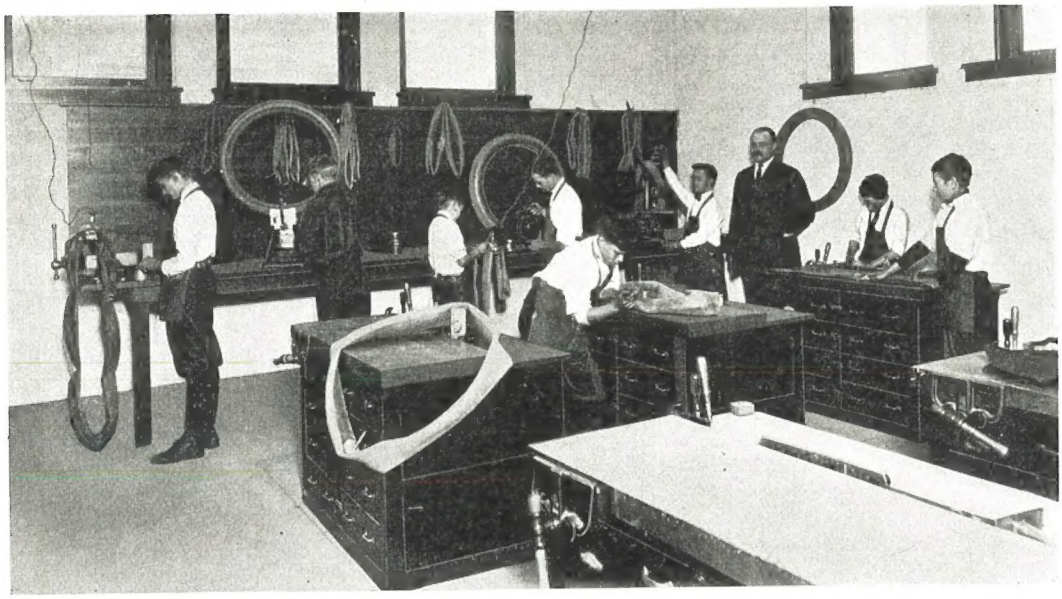
The medical certificate is in the form of an examination card, given by the teacher to the child and filled out by the family or district physician. It contains the findings of the physician and a statement relative to fitness for employment.

The age certificate is required of all children who ask for work and seeks to verify the age given by the child. The necessary information may be obtained from a local

vital statistics bureau or from the pastor of the church attended. For foreigners, a passport will be accepted.

The three certificates just described must be presented to the employment certificate office for approval or disapproval. If they are approved, the official fills out a general working certificate. This certificate is not given to the child but is mailed to the employer who files it in his office. Three days after receipt of the certificate, the employer must fill out and mail an acknowledgment form to the employment certificate office. Four days after employment, the employer is required to fill out a second form which is sent to the school authorities showing the days, time of day and the school that the boy or girl will attend while employed. The working certificate of the child is retained in the office during his employment, and is returned to the employment certificate office when he leaves.

The steps necessary to obtain a working permit have been made quite difficult to prevent fraud and to deal justly with all the children. It is the opinion of the Pennsylvania authorities that the better practice is to issue the permit to the employer. The latter is held responsible for its safe keeping and he must return it to the employment certificate office when the child leaves his employment. The device makes it possible to enter the child in the all-day continuation school during periods of non-employment.



A CLASS IN VULCANIZING AUTOMOBILE TIRES.

The photograph illustrates a class of boys in the Duquesne, Pa., High School learning to vulcanize automobile tires under the direction of Mr. Charles A. Wardner, supervisor of manual training.

The class was organized in response to a request from the boys themselves. The instructions include complete directions for cleaning the rubber with sandpaper and gasoline, for proper applying cement and raw rubber and for curing the rubber in the vulcanizing machine. Several types of electric and steam vulcanizers are used.

The students bring in the tires which are to be repaired and furnish the raw gum which they use. Some difficult work has been accomplished in repairing both inner tubes and outer casings. One student repaired a sixteen inch blowout in an inner tube so that the tube was returned to service on a delivery truck. The boys during the months of November and December, 1915, built a large steam vulcanizer from their own design.

THE SCHOOL ART LEAGUE MEETS.

At the annual luncheon of the School Art League of New York, held on December 5th in the Waldorf-Astoria Hotel, considerable surprise was expressed when it was stated that nearly 70,000 persons have been reached by the league during the year 1915 with a budget of less than $3,500. The league has distributed more than four hundred medals in the schools and, thru the assistance of public-spirited citizens, maintains scholarships for talented art students in the various industrial schools.

During the luncheon, a number of interesting addresses were delivered. Mr. Henry Bruere, city chamberlain, spoke on the subject of "training the citizens to appreciate art." Dr. John H. Finley, of the University of New York, praised the work of the league in the schools. He spoke of the growing appreciation of the children for art work and said that they were beginning to realize that the city's art treasures were their own. Mrs. V. G. Simphovitch told of the entrance of art into the homes of the poor and what its enjoyment meant to them.

At the conclusion of the luncheon, a number of students of the high schools gave exhibitions of drawing skill. Sketches in color were completed in eight minutes while the guests looked on.

INDUSTRIAL EDUCATION CONFERENCES IN PENNSYLVANIA.

One of the largest educational conferences held in Pennsylvania during 1915, was held on December 4th in the city of Reading. The meeting was under the auspices of the Schuylkill Valley Schoolmasters' Club, with the Northampton Teachers' Club, the Valley Arts Association and the Continuation Teachers' Club of Eastern Pennsylvania, as guests. About 450 were in attendance.

The program for the Valley Arts Section was: "What Can a Special Teacher do to Arouse Interest in Special Subjects"; "Relation of Sewing and Household Design and the School Pageant"; "Should Nursing be Taught in the High Schools"; "Figure Drawing"; "Vocational Guidance a Part of the School System."

A joint meeting of the societies was held in the auditorium of the Boys' High School, with lectures by Mr. Arthur W. Dunn, Special Agent of the Bureau of Education, Washington, D. C., on Citizenship, and by Mr. Millard B. King, Director of Industrial Education, Pennsylvania State Department of Education, on Continuation Schools. The meeting was concluded with a visit of inspection thru the various departments of the high and vocational schools of the city.

The Mountain District Arts Conference.

The Mountain District Arts Association held a conference on December 11th at Williamsport, Pa. Mr. George Barbey, president of the association, acted as chairman.

The subject for discussion was Vocational Guidance. It was opened by an address by J. L. Noll of Altoona, followed by others along the same line. Round-table conferences were conducted from 1:30 to 12:00 o'clock. The Household Arts Section discussed the following topics: How to Best Teach Marketing, by Miss Stella Wertz of Altoona, Miss Esther R. Davies of Mansfield, and Mrs. Beulah Manley of Williamsport; Making the Domestic Arts Work Re-enforce the School Festival, by Miss Louise S.

Shomberg, Miss Lucy Kemmerer of Bellefonte, and Miss Mary Woodward, Williamsport.

The Drawing and Music Sections discussed the following topics: Presentation of Design to an Upper Grade, Miss Flora B. Potter, Johnstown, Miss Marjorie Baldwin of Lock Haven, Miss Rena Frankeberger, Williamsport and Prof. Richard Ernesti, State College.

The following papers were included in the program: A More Serious Effort in Behalf of the Monotone, Miss Helga L. Swen, Johnstown, Mr. C. Burdick Keim, Mansfield, Miss Florence Atticks, Lock Haven, and Mrs. G. C. Milleisen, Altoona; What is the Plan of Geometrical Construction in Teaching Mechanical Drawing, Charles C. Sadler, Altoona, Thos. R. Davies, Shamokin, A. D. Miller, Mt. Carmel and Prof. R. I. Webber, State College; When and to What Extent is the Use of Woodworking Machinery in the Public Schools Testifying, Lorenzo Carlton, Clearfield, L. D. Bullard, Williamsport and Jos. Miller, Altoona.

A general meeting was held in the afternoon, with a discussion of the topic: What Can Special Teachers Do to Arouse Community Interest in Special Subjects?

The Allegheny Arts Association Conference.

THE ALLEGHENY ARTS ASSOCIATION of Pennsylvania held its autumn conference on December 4th at Pittsburgh. The meetings were held in the auditorium of the Industrial Building of Carnegie Technical Institute, and were attended by two hundred teachers.

The morning session was devoted to discussions on Music and Household Arts. The afternoon was given to round-table conferences of sewing, cooking, drawing, music and shop teachers. A feature of the meeting was an exhibit of students' work which was on display in the various shop buildings of the Institute.

The Metropolitan Arts Conference.

THE METROPOLITAN ARTS CONFERENCE held its second meeting on December 4th in the William Penn High School, Philadelphia. The details for the meeting were in charge of Chairman C. E. Karlson, Director of Manual Training at Elkins Park, and an executive committee.

The sessions opened at nine o'clock with discussions on the topic, Qualifications for Manual Arts Teachers, by Edward A. Mieder of Abingdon Township and Mr. Claghorn of Swarthmore. Establishing a Vocational School or Department was discussed by E. L. Bowman of the Pennsylvania State Department. Mr. S. I. Kreemer of West Chester, discussed the steps in the organization of the West Chester ungraded, day-vocational school. Drawing and English work given in the schools were discussed and commented on. A third topic discussed was a Cost System for the Manual Arts, by Mr. C. W. Reed, a representative of the Manual Training faculty of the Philadelphia schools. He commented upon the form required for order systems and methods, and gave an account of the work performed in the Philadelphia schools.

The afternoon was given to four round-tables in drawing, music, domestic arts and manual arts. The first was addressed by Mr. Paul E. Beck of the State Bureau of Vocational Education. The domestic arts round-table discussed The Relation of Sewing to Costume Design. The manual arts discussion was along the line of lettering and was presented by Mr. S. V. Rinehart. The subject was The Schoolroom: Its Advantages and Disadvantages. Mr. Leroy Hosler, of Chester, discussed equipment.

The next meeting of the association will be held in May, at Philadelphia.

EASTERN ARTS CONVENTION.

THE officers of the Eastern Arts Association have announced that the next convention will be held at Springfield, Mass., on April 20, 21 and 22. Mr. E. E. MacNary has been selected to act as chairman of the local committee. The program and the general preparations for the convention are well under way.

The announcement has been made by President Millard B. King that copies of the proceedings for the years 1913 and 1914 will be distributed to new members of the association so long as the supply lasts. The volume, which includes 300 pages, is edited by Royal B. Farnum and contains over fifty papers and other rich material for supervisors and teachers of the manual and household arts. Among the contributors are F. G. Bonser, Charles A. Prosser, James P. Haney, Emma M. Church and others of similar standing in the field. Various topics relating to the vocational, industrial and household arts are discussed.

Teachers who send $1.50, dues, to Mr. Fred P. Reagle, secretary, Montclair, N. J., will receive a copy of the volume as well as the proceedings for 1915.

SHOPWORK IN THE NEW YORK CITY ELEMENTARY SCHOOLS.

THE recent report of Walter S. Goodnough, Director of Shopwork in the city schools for the year 1914-15, gives some interesting facts concerning the practical character of the work.

The Director shows that the boys in the elementary shops made repairs to school furniture totaling $1,828. They also made 10,828 articles for school use, with a total value of $6,314. In several schools, the boys studied boat and yacht building and made boats of various types.

A good idea of the enrollment may be gained when it is stated that 71,097 boys received instruction in the shops up to June, 1915. The enrollment represented three boroughs, the largest number coming from Manhattan and numbering 27,034 boys.

The shopwork is limited to woodworking and is intended to give the pupils a wide range of experience in tools, drawing, reading plans, and in design. It embraces patternmaking, framing, house finishing, and house and office furnishing. There are 113 artisan teachers employed. These are workers from the various trades who have been especially trained for teaching mechanics to boys. The work has been extended to boys of the fifth and sixth grades, who are 13 years old and over, and who expect to leave school to enter an occupation. The course gives the boys a better start in the trades when they leave school. They have learned the use of tools and can easily learn a trade.

NEWS AND NOTES.

THE MANUAL ARTS DEPARTMENT of the Rock Hall, Md., High School has been enlarged considerably since the completion of the new Rock Hall High School Building. Complete equipment of new benches has been installed and a four horsepower gasoline engine has been purchased to run the saws, lathes, etc. The department is now engaged under the direction of Mr. F. A. Greenhawk in building the complete equipment for the domestic science department and the drawing department.

AN INVESTIGATING COMMITTEE on the Gary plan and other experimental plans for the wider use of the school plants has been appointed recently by the Shopwork Teachers' Association of New York City. It is the plan of the committee to make a thoro study of the several schemes as they apply to the use of the school shops and the extension of the manual arts work.

NEW YORK CITY. On December 1, 1915, 240 manual training shops were in operation in the elementary schools of New York City. A total of 220 teachers of shop work were engaged in the teaching of about 65,000 boys each week. These figures do not include vocational or prevocational schools. The sum of $25,000 has been appropriated for the installation of power machinery in fifty elementary school shops.

BESIDES introducing the four-year system at the Dunn County Agricultural School at Menomonie, Wis., at the beginning of the fall term, the county board has added a girls' dormitory. The house is modern and everything but the bedding is furnished by the school.

Board at the dormitory costs three dollars a week. The students under the direction of the two Domestic Science teachers from the school, Miss Knapp, who teaches sewing, and Miss Stevenson, the cooking teacher, do all the work; even to the cleaning and laundry work. The Seniors direct the Juniors in preparing the meals.

Mrs. Strong, a Stout Senior, is the matron. At present but six girls can be accommodated in the dormitory but the school hopes to increase the number in time for the fall term of 1916.

EVANSVILLE, IND. The board of education has adopted a recommendation providing that the State Board be asked to conduct an industrial survey of the city. The survey is intended to be a means of ascertaining the possibilities and the need for day vocational schools.

RECENT BOOKS AND PAMPHLETS

Principles and Practice of Elementary Drawing.

By Mabel Browning Soper. 147 pages. List price $1.50. Scott, Foresman & Company, Chicago, New York.

This is a normal school textbook. It is compiled and written as a result of experience with classes of prospective teachers of courses of drawing, as established in the elementary public schools.

The book presents in excellent order and form, the methods of developing observation and appreciation in children, and gives definite exercises in drawing and design with clear explanation and illustration.

Many of the illustrations are in color, and all of them are to the purpose. Design; Lettering; Representation; Mechanical Drawing; and Color are presented in the separate divisions of the text.

It is a book which should be especially helpful to the teacher of elementary classes who feels a lack of ability to formulate and present a course in drawing under prevalent limited time and conditions.

Prevocational Education in the Public Schools.

By Frank M. Leavitt and Edith Brown. 245 pages. Price, $1.10, net. Houghton Mifflin Co., Boston.

This book presents in a readable form, the lessons learned in a large number of experiments, which have been made in an attempt to deal with what the authors term, the "prevocational" type of pupils.

Persons desiring to open special schools or classes for boys and girls between the ages of 12 and 15, who are restless in the "regular" school and anxious to get into industrial life, will find in this book material which will greatly assist them in organizing and conducting such classes. In presenting this material in a concrete form the authors have made a valuable contribution to the literature of vocational education.

English for Boys.

Material and Method. By Homer J. Smith. Paper, 16 pages. Price, five cents. Published by the author at 414 Greenfield Ave., Milwaukee, Wis.

This pamphlet has been developed as the result of some years spent in teaching English classes of boys in a public day-trade school. It presents six type lessons and much material for developing similar lessons. The pamphlet is particularly happy in making clear that the ability to speak and write correctly, clearly and effectively is essential to the success of any man in any work. The lists of terms used in the various trades include sufficient words to give boys a good working vocabulary.

Interior Decoration—Its Principles and Practice.

By Frank Alvah Parsons. 284 pages. Price, $3, net. Doubleday, Page & Co., Garden City, N. Y.

While this book has been written for the home owner rather than the student or the artist, its author has been so long a teacher that he cannot write except in a style that must cause the reader to think and remember. His statement of the underlying theories of interior decoration, his definitions, the historical account of the style periods, all are distinguished by the clearness and simplicity of a master teacher without losing in any respect informality of expression, rounded sentence forms and an interesting manner of description and discussion.

The book opens on the assumption that the house is the man himself, expressed in color, form, line and texture, and that 95 per cent of all people who use a house are artists in the sense of possessing ability to group art objects and to appreciate them. They have no conception of what decoration really is, and they are vastly in need of information on basic principles and means. He suggests, first of all, that ugly things be eliminated and then explains the fundamental ideas of color, form, balance, emphasis and unity, scale, motifs and textures as they relate to furnishing and decorating.

Thruout this section of the book, which occupies the greater portion of the volume, principles are explained and vitalized by reference to historic and modern practice, by instructions and suggestions for handling a thousand-and-one minor details in the furnishing and equipment of rooms that in themselves are trivial, yet of importance.

The second part of the book describes very briefly the meaning and the distinguishing features of the great historic styles, and by inference suggests the use of the best in them and the avoidance of their shortcomings and inconsistencies. The author intimates that we are at the beginning of a second Renaissance.

The third part of the book is taken up with a discussion of the problem of the modern house, and suggests ways and means by which the individual householder may create an environment that is truly personal, consistent and sincere.

The book will be found an invaluable work of reference in high schools as well as in the library of the home.

First Aid.

In the Laboratory and Workshop. By A. A. Eldridge and H. V. A. Briscoe. Cloth, 32 pages. Price, 35 cents. Longmans, Green & Co., New York.

Two professors of the British Imperial College of Science, after much experience in treating injuries in chemical and mechanical laboratories, have prepared this handbook of first aid. The book is distinguished by extreme brevity and clearness so that almost instant reference may be made. A few of the English common names for chemicals may be confusing to some American teachers.

NEW PUBLICATIONS.

Poultry House Construction. Bulletin 81, Agricultural Experiment Station, Storrs, Conn. Gives plans for various poultry houses, trap nests and feed hoppers.

Progress in Vocational Education. By Wm. T. Bawden. A reprint from the report of the Commissioner of Education for the year ending June 30, 1914.

Vocations for Rochester Boys and Girls. Bulletins issued by the Department of Public Instruction, Rochester, N. Y. These bulletins were compiled by Raymond C. Keople, the material being taken from the survey made by the Rochester Chamber of Commerce.

No. 1 discusses the machine industry and compares the progress of a boy who left the grammar school for work with that of a boy who attended the shop school. It also explains a trade agreement made by employers in machine-shop work with the school authorities by which the graduates of the shop school should be taken into the shops.

No. 2 discusses the woodworking industry; No. 3 describes the work and opportunities for advancement in collar factories; and No. 4 is devoted to a discussion of the clothing industry for girls. The bulletins demonstrate a practical method of distributing vocational information.

GINN & COMPANY have announced the publication of a new textbook in vocational guidance, written by Prof. E. B. Gowin of New York University and Supt. Wm. A. Wheatley of Middletown, Conn. The book is not a theoretical discussion but a text to be placed in the hands of first and second-year students in the high school. Part I will discuss the necessity of preparing for a career, and Part II will describe in detail, the various occupations open in the United States.

Industrial Education. Report of the Committee on Industrial Education of the National Association of Manufacturers. Issued from the Secretary's office, 30 Church St., New York. This report reflects very accurately the position of the National Association of Manufacturers in the matter of industrial education. Mr. Miles, the chairman, argues chiefly for the continuation school of the Wisconsin type and for the day shop school of the New Haven, Conn., type.

The Artisan. A monthly magazine edited, printed and published by the students of Dunwoody Institute, Minneapolis. The first issue of this student magazine gives promise of a new standard in school papers. The news departments which make up the bulk of the paper, are breezy and informational. The typographical "dress" has been chosen with much care and taste. There is, in fact, a workmanlike finish and appropriateness in every detail that might be studied with profit by the producers of other school papers.

NOW, ARE THERE ANY QUESTIONS?

This department is intended for the convenience of readers who may have problems and questions which trouble them. The editors will reply to questions on industrial arts, which they feel they can answer, and to other questions they will obtain replies from persons who are competent to answer. If an answer is desired by mail, a stamped envelope invariably should be enclosed. Address, Editors, Industrial-Arts Magazine, Milwaukee, Wis.

Finishing Cedar.

260. Q:—Can you inform me of any way in which red cedar may be treated to keep it from fading?—*G. W. D.*

A:—The best treatment for cedar is to give the wood a coat of a mixture of one part each of boiled linseed oil and turpentine, or naphtha. When this is dry it should be followed by a coat of white shellac and two coats of varnish, rubbed dull. If a waxed finish is desired, two coats of shellac will be necessary before applying the wax.

The mixture of oil and turpentine will intensify the color of the wood and prevent fading.

Stain would discolor the white or sapwood, and this is not usually desirable, as cedar is mostly finished natural.—*J. M. Dorrans.*

Mathematical Curves.

278. Q:—There is a mechanical method for constructing an approximate involute to a circle by using a square, pentagon or other regular polygon. Is there any mechanical method for constructing an exact involute to a circle? Given an involute curve, is there any mechanical method of constructing its evolute? Is there any method for constructing an involute to any given curve as for example, the ellipse, parabolas or hypebolas?—*O. L. T* and *L. A. S.*

A:—A mechanical method for constructing the involute of a circle is given in Kent's "Engineer's Pocketbook." (Wiley), Page 52. This method is exact but it is not applicable to any other curve.

A general method will be found in Granville's "Calculus," page 187.

It is obvious that when the involute is given the evolute may be constructed by drawing normals to the involute and taking their envelope.—*C. T. B.*

Care of a Circular Rip Saw.

279.*Q*:—Will you please explain to me very explicitly, the upkeep of a circular rip saw, including the swaging and gumming processes? Also, the equipment needed to do this work?—*E. L.*

A:—The care of circular rip saws is fully explained in Disston's Handbook on Saws. A copy may be had gratis by addressing Henry Disston & Sons, Philadelphia.

French Polishing.

305. Q:—While visiting a boxwood rule company recently, I noticed the ease with which an operator put the finishing polish on the boxwood sections. It looked like a compound of shellac and oil and was rubbed on with a piece of waste. By giving the piece a good firm stroke a lasting satin finish was obtained. Could you give me the combination?—*A. R. M.*

A:—The process of polishing which you refer to is undoubtedly a process of French Polishing. This may be obtained in the following manner:

Make a ball of cotton waste about 2½ inches in diameter. Cut two pieces of cheesecloth about 6 inches square to wrap around the waste, thus forming a pad. Apply shellac varnish to the cotton waste. Wrap the two pieces of cheesecloth around the waste and squeeze the shellac thru to the surface of the pad. Apply two drops of raw linseed oil to face or surface of the pad and rub, for a large surface, in a circular motion, squeezing the shellac on to the face of the pad, or rubber, as it becomes dry. Use only sufficient oil to keep the pad from sticking. When the outer pad becomes worn or rough, remove it and use the one underneath. Orange or white shellac may be used. The addition of gum sandarach powdered and dissolved in the shellac, (¼ oz. to 1 pt. of shellac) will make the surface more elastic. The number of applications will depend on the kind of wood and the quality of finish desired.—*J. M. Dorrans.*

315. Q:—I should like very much if you would let me know of some good book on "Interior Decoration" that might be adapted to school use.—*W. J. A.*

A:—The following books will be of use:

Home Furnishing. By Alice M. Kellogg, Frederick A. Stokes Co., New York.

Principles of Home Decoration. By Candace Wheeler. Doubleday, Page & Co., New York.

Homes and Their Decorations. By Lillie H. French. Dodd, Mead & Co., New York.

House Decoration and Repairs. By C. Orlando Law. John Murray, London.—*E. J. L.*

318. Q:—Please state the addresses of firms which make the display boards of hardware and spoons mentioned on page 154 of the October, 1914, issue of THE INDUSTRIAL-ARTS MAGAZINE.—*R. B. C.*

A:—The display of spoons illustrated in THE INDUSTRIAL-ARTS MAGAZINE for October, 1914, was prepared by the American Silver Company of Bristol, Conn. The card will be sent to schools upon receipt of fifty cents in stamps. It will be well to state the size of your school in writing this firm.

The display of hardware shown in Mr. Crawshaw's article was made up by a hardware house in the Middle West. A similar card can be obtained at a very reasonable cost from the Orr & Lockett Hardware Company, Chicago.

319. Q:—Could you please tell me where I can obtain copies of C. A. Prosser's "The Place of Art in Industry"?—*W. E. G.*

A:—Copies of this pamphlet may be obtained from the National Society for the Promotion of Industrial Education, Mr. Alvin E. Dodd, Secretary, 140 West 42nd St., New York City.

Correspondence Courses.

320. Q:—Could you tell me where I could get the following courses by correspondence and count towards university credit? Advanced architectural drafting, sheet metal drafting and machine drawing and design.—*R. L. H.*

A:—Careful inquiry fails to reveal courses in any accepted institution. Perhaps some reader can suggest a school.

Castings for School Shops.

324. Q:—We have in our high school a machine shop but no foundry. We have therefore experienced some difficulty in getting good castings for machine shop problems which will interest the boys. If you know of any concern which makes a specialty of furnishing castings of small gas engines, or of similar projects, kindly give me their name and address.—*A. B. L.*

A:—J. D. Wallace, 524 Van Buren St., Chicago, is devoting his attention to furnishing schools with castings and drawings of machine shop problems. He has castings for a small gas engine which can be easily made in a school shop.

THE NEW YORK BOARD OF EDUCATION has appointed an advisory board of five to co-operate with the heads of the vocational schools and the committee on vocational education. The advisory board is made up of Mr. Samuel Rosenthal, Mr. C. G. Norman, Mr. John J. Munholland, Mr. E. J. Deering and Miss Leonora Reilly. Messrs. Rosenthal and Norman are employers who have been interested in apprenticeship and trade instruction. Mr. Munholland is secretary of the patternmakers' association which has since 1912 co-operated with the public school authorities in providing that its apprentices take continuation school work. Mr. Deering is the business agent of the machinists' union and a member of the conference of organized labor on industrial education. Miss Reilly has been a shirtmaker and teacher and has intimate knowledge of the needle industries.